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NEW SERIES

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ON THE VARIETY OF LINES OF DESCENT REPRESENTED IN A POPULATION

BY FRANZ BOAS

THE degree of variation of the individuals composing a population is expressed by means of tables showing the distribution of the values of the particular measurement that is being considered; and the range of variation may be studied by the usual methods, particularly by means of the standard deviation of the series.

In this case the individuals are considered as representatives of the whole series, without any regard to the descent of each. It may therefore well be that, from a biological point of view, two series having the same degree of variability of the component individuals are quite distinct. In one extreme case we may imagine the population as consisting of a number of entirely distinct lines of descent, in which each line represents a particular type. Then by grouping together the individuals of each type, we obtain a series of types different among themselves, which would indicate the heterogeneity of the types that enter into the constitution of the whole population. In the other extreme case we may imagine all the lines of descent composing the population to represent the same ancestral strain. Obviously in this case every single ancestral line would be representative of the whole population, and the averages of all the different lines would be the same.

In other words, in the former case, each line of descent will be characterized by certain traits; in the latter case, all lines of descent will be the same. This latter case would be the result of an absolute inbreeding; and there could no longer be any family resemblance, because all the families would be alike, and in every family all the varying types of the population would be represented. A fraternity would be an adequate representation of the whole people or of a local type.

This case, of course, cannot possibly occur in man. It corresponds to the individuals composing the pure lines of Johannsen, which I should prefer to term "lines of identical descent." In man we can expect only an approach to these conditions, that may develop with continued inbreeding, such as is characteristic of stable rural communities or of primitive tribes in thinly settled countries.

The other extreme is represented by new dense populations, like that of the United States, in which there has not been time for a permeation of the constituent elements. The conditions that develop in a mixed white and negro population will illustrate the characteristics of these conditions. If in such a population whites and negroes do not intermingle, the racial position of each individual will at once be indicated by the fact that all the members of his family will possess the same racial traits, or show a marked resemblance in this respect. On the other hand, in a mulatto population, such differences between members of families cannot exist, but all family strains will show equally effects of mixture. In the former case we have a strong selective mating, in the latter case, none.

Thus it appears that strong family resemblances in a population are indications of the heterogeneity of the composite lines of descent.

The heterogeneity of which I speak here is therefore not an expression of the purity of racial descent, for identity of the lines of descent represented by the families of the population may well be found in cases in which a few ancestors belonged to distinct racial types, but in which the modern population developed by long-continued inbreeding without selective mating. It is rather an

expression of the differences between the various lines of descent represented in a population.

From all I have said, it appears that, in a population in which the lines of descent are the same for each fraternity, we should expect the averages of these fraternities to be identical, provided the fraternities are large enough. In populations in which the lines of descent are quite distinct, we should expect the averages of the fraternities to differ strongly among themselves. In other words, the variability of the average of the fraternities will be a measure of the heterogeneity of the lines of descent.

This value, however, cannot be obtained by direct observation, because in man each fraternity comprises a few individuals only.

We will call the general average of the measurement studied a; its standard variation, σ; the number of children in a certain group, m; and the deviation for each child from the general average, x. Then the average for each family is

$$a = \frac{x_1 + x_2 + \cdots + x_m}{m},$$

and therefore the variability of these averages.

$$s_m^2 = \left[\left(\frac{x_1 + x_2 + \cdots + x_m}{m}\right)^2\right],$$

where the brackets indicate the process of averaging. If we call the coefficient of fraternal correlation r, we have

$$s_m^2 = \frac{1 + (m - 1)r}{m}\sigma^2.$$

For a very large number of children,

$$s^2 = r\sigma^2 = [xx].$$

The heterogeneity of descent may therefore be determined directly from the two values r and σ.

In calculating the coefficient of fraternal correlation, it is necessary to treat families with 2, 3, 4, etc., children separately, because the weights of the coefficients of correlation obtained from each group are not the same. This is due to the fact that in fraternal

correlations each individual appears a number of times, as he is correlated with each member of the fraternity.

In our series we are dealing with large numbers of cases, so that the value of the coefficient and also the value of σ may be assumed to be known accurately. The coefficient is calculated from the products $x_a x_b$. If f is the number of families, the average product

$$[xx] = \frac{1}{f} \Sigma \frac{x_1x_2 + x_1x_3 + \cdots + x_ax_b + \cdots + x_{m-1}x_m}{\frac{1}{2}m(m-1)}.$$

Its standard error is

$$\epsilon^2 = \left[\left\{ \frac{1}{f} \cdot \Sigma \frac{x_1x_2+x_1x_3+\cdots+x_ax_b+\cdots x_cx_d+\cdots+x_{m-1}x_m}{\frac{1}{2}m(m-1)} - r\sigma^2 \right\}^2 \right].$$

When squaring the sum, the products of the terms representing different families are all independent, and each will be, on the average, $r\sigma^2$. There are $f(f-1)$ products of this type. Therefore

$$\epsilon^2 = \frac{\Sigma x_a^2 x_b^2 + \Sigma x_a^2 x_b x_c + \Sigma x_a x_b x_c x_d}{f^2 \frac{1}{4} m^2 (m-1)^2} + \frac{f(f-1)}{f^2} r^2\sigma^4 + r^2\sigma^4 - 2r\sigma^2 \left[\frac{1}{f} \cdot \Sigma \frac{x_1x_2 + \cdots + x_ax_b + \cdots x_{m-1}x_m}{\frac{1}{2}m(m-1)} \right].$$

The last average is $r\sigma^2$.

There are $f \dfrac{m(m-1)}{1 \cdot 2}$ members of the type $x_a^2 x_b^2$

$f\, m(m-1)(m-2)$ " " " " $x_a^2 x_b x_c$

$f \dfrac{m(m-1)(m-2)(m-3)}{4}$ " " " " $x_a x_b x_c x_d$

Therefore

$$\epsilon^2 = \frac{2[x_a^2x_b^2] + 4(m-2)[x_a^2x_bx_c] + (m-2)(m-3)[x_ax_bx_cx_d]}{fm(m-1)} - \frac{r^2\sigma^4}{f}$$

$$[x_a^2x_b^2] = r^2[x_a^4] + (1-r^2)\sigma^2[x_a^2]$$

$$= (1+2r^2)\sigma^4$$

$$[x_a^2x_bx_c] = \frac{r}{1+r}[x_a^2x_b(x_a+x_b)]$$

$$= \frac{r}{1+r}([x_a^3x_b] + [x_a^2x_b^2])$$

$$= \frac{r}{1+r}(r[x_a^4] + (1+2r^2)\sigma^4)$$

$$= r(1+2r)\sigma^4$$

$$[x_ax_bx_cx_d] = \frac{r}{1+2r}[x_ax_bx_c(x_a+x_b+x_c)]$$

$$= 3r^2\sigma^4$$

By substitution,

$$\epsilon^2 = \frac{2(1+2r^2)+4(m-2)(r+2r^2)+(m-2)(m-3)3r^2-m(m-1)r^2}{fm(m-1)}\sigma^4$$

$$= \frac{1+2(m-2)r+(m^2-3m+3)r^2}{f\dfrac{m(m-1)}{2}}\sigma^4.$$

If we designate the total number of individuals $fm = n$,

$$\epsilon^2 = \frac{2}{m-1}\cdot\frac{1+2(m-2)r+(m^2-3m+3)r^2}{n}\sigma^4.$$

From this we obtain for various families the following values of ϵ^2:

For 2 children ..... $\frac{2}{1}\frac{1+r^2}{n}\sigma^4$

" 3 " ..... $\frac{2}{2}\frac{1+2r+3r^2}{n}\sigma^4$

" 4 " ..... $\frac{2}{3}\frac{1+4r+7r^2}{n}\sigma^4$

" 5 " ..... $\frac{2}{4}\frac{1+6r+13r^2}{n}\sigma^4$

" 6 " ..... $\frac{2}{5}\frac{1+8r+21r^2}{n}\sigma^4$

" 7 " ..... $\frac{2}{6}\frac{1+10r+31r^2}{n}\sigma^4$

For values of r, this gives the following values for $\frac{n\epsilon^2}{\sigma^4}$:

r	0.00	0.10	0.20	0.30	0.32	0.34	0.36	0.38	0.40	0.42	0.44	0.46	0.48	0.50
2 children...	2.00	2.02	2.08	2.18	2.20	2.23	2.26	2.29	2.32	2.35	2.39	2.42	2.46	2.50
3 " ...	1.00	1.23	1.52	1.87	1.95	2.03	2.11	2.19	2.28	2.37	2.46	2.55	2.65	2.75
4 " ...	.67	.98	1.39	1.89	2.00	2.11	2.23	2.35	2.48	2.61	2.76	2.88	3.02	3.17
5 " ...	.50	.86	1.36	1.98	2.12	2.27	2.42	2.58	2.74	2.90	3.08	3.25	3.44	3.62
6 " ...	.40	.80	1.38	2.12	2.28	2.46	2.64	2.83	3.02	3.22	3.44	3.65	3.87	4.10
7 " ...	.33	.77	1.41	2.26	2.46	2.66	2.87	3.09	3.32	3.56	3.80	4.05	4.31	4.58

From these may be derived the following relative weights:

r	0.00	0.10	0.20	0.30	0.32	0.34	0.36	0.38	0.40	0.42	0.44	0.46	0.48	0.50
2 children...	50	49	48	46	45	45	44	44	43	43	42	41	41	40
3 " ...	100	81	66	53	51	49	47	46	44	42	41	39	38	36
4 " ...	150	102	72	53	50	47	45	43	40	38	36	35	33	31
5 " ...	200	116	74	50	47	44	41	39	37	34	32	31	29	28
6 " ...	250	125	72	47	44	41	38	35	33	31	29	27	26	24
7 " ...	300	130	71	44	41	38	35	32	30	28	26	25	23	22

I have computed, according to this method, the correlations for several nationalities. The material is the same as that on which my reports on the "Changes in Bodily Forms of Immigrants" is based.[1] I have computed the coefficients of fraternal correlation for the cephalic index, assuming the same correction for all children which I developed in the book just referred to; namely, a decrease of the cephalic index of 0.14 unit per year until the twentieth year is reached; and a reduction of females to male values by assuming from 17 years on a difference of 0.5 unit, the men being more long-headed than the women.

The actual calculation was made according to the formula

$$\Sigma xx = \tfrac{1}{2}\{(\Sigma x)^2 - \Sigma x^2\}.$$

SQUARES OF STANDARD DEVIATION OF xx.

No. of Children in Family	Bohemian			Central Italian		
	No. of Families	Variation of xx		No. of Families	Variation of xx	
		Observation	Theory		Observation	Theory
2	253	217	183	193	187	209
3	94	116	131	108	94	147
4	52	93	111	62	105	125
5	16	96	100	30	174	112
6	5	31	94	17	50	80

[1] *Changes in Bodily Form of Descendants of Immigrants* (final report). Columbia University Press, 1912.

I have also calculated for two types the standard variations of the values xx and their averages, in order to give a means of comparison of the theoretical values given above and the empirical values. The variation of xx is of course strongly skew.

Following are the results for a few populations:

	$[xx]$	ε
Bohemians	5.60	± 2.37
Central Italians	5.72	± 2.39
(Potenza)	(5.83)	(± 2.41)
East European Jews	5.25	± 2.29*
Worcester, Mass.	5.46	± 2.36
Scotch	4.72	± 2.17

* Calculated from 255 families of 2 children.

It appears from these few samples that the variation in lines of descent in Europe seems to be very uniform. The selection of Potenza, a smaller district of Central Italy, does not show a decrease of the variability of lines of descent.

Theoretically the interesting and important question would be, how low the values of the heterogeneity of lines of descent may be in extreme cases. As indicated before, it seems very likely that, with long-continued inbreeding without selective mating, the average for the families might be very much alike.

I have no material from European villages that would lend itself to a test of this problem; and reliable material from primitive tribes is difficult to obtain, because in most cases the actual biological relationships are uncertain. I am indebted to Professor Eugen Fischer for data on the Bastards of South Africa that were not published in his volume.[1] I have treated them in the same manner as the European material. There are 75 individuals in all.

4	families	of	2	children.
4	"	"	3	"
3	"	"	4	"
2	"	"	5	"
3	"	"	6	"
1	family	"	7	"
1	"	"	8	"

[1] *Die Rehobother Bastards.* Jena, 1913.

The observations give an average for the whole series of 75.9; $\sigma^2 = 6.5$.

$$\text{Bastards } [xx] = 1.6 \quad s = \pm 1.26$$

In this series, in which descent is probably in the great majority of cases reliable, and in which we have long-continued inbreeding, we have therefore much greater uniformity of the various family averages. The calculation of observations collected in 1892 among the eastern Chippewa of Canada gives similar results. The data were collected among the Missisauga and other bands north of Lake Huron. I have the following family groups at my disposal:

	Missisauga	Other Chippewa
Families of 2 children	38	23
" " 3 "	10	6
" " 4 "	6	4
" " 5 "	2	3
" " 6 "	1	–

There are 146 and 95 individuals respectively. The series give the following results:

Missisauga	$a = 80.4$	$\sigma^2 = 12.0$	$[xx] = 2.40$	$s = \pm 1.47$
Other Chippewa	82.1	14.1	3.14	$s = \pm 1.77$

In both cases we have populations containing many half-breeds, but, on the whole, an old inbred mixture.

The results given here might be doubted, on account of the uncertainty of parentage among Indians. However, this condition is always clearly expressed in the coefficients of correlation obtaining between father and child. There is hardly ever a doubt as to the relation between child and mother, so that this correlation can be taken as nearly correct. I have calculated for both groups of Chippewa the correlations between parents and children. I give the values of $[xy]$ and r, and the number of pairs from which they are derived.

	Father and Children.			Mother and Children.		
	$[xy]$	r		$[xy]$	r	
Missisauga	0.65	0.05	(30)	1.23	0.10	(69)
Other Chippewa	3.30	0.24	(66)	2.50	0.16	(48)

The correlations between mother and child are low, and on the average not higher than those of the fathers. Even if we might consider the value as a little too low, we are justified in concluding that the correlations are much lower than in European populations. It is easy to see that the correlations between parents and children will also be the lower, the more uniform the lines composing the population. This point has been made by Johannsen in his "Exakte Erblichkeitslehre."

The square standard variation of individuals composing a family, *i. e.*, of the fraternities, is a correlate of the variability of family lines, and must average $\sigma^2(1 - r)$. In the following table I give the variability of the fraternities s_f, and, for the sake of comparison, repeat the variabilities of the family lines s.

	$s_f =$	$s =$
Bohemians	± 2.61	± 2.37
Central Italians	± 2.72	± 2.39
(Potenza)	± 2.52	± 2.41
East European Jews	± 2.52	± 2.29
Worcester, Mass.	± 2.36	± 2.36
Scotch	± 2.66	± 2.17
Bastards	± 2.52	± 1.26
Missisauga	± 3.10	± 1.47
Other Chippewa	± 3.32	± 1.77

I presume the high values among the Chippewa are due largely to the great difference in type between the component elements of the mixed population, the Irish and French being long-headed, the Chippewa short-headed. It is possible, however, that inaccuracy of information regarding the actual relationships accounts for part of these phenomena.

COLUMBIA UNIVERSITY,
NEW YORK CITY

DYNAMOMETRIC OBSERVATIONS AMONG VARIOUS PEOPLES

By H. F. C. TEN KATE

THE following article is a brief abstract of a paper originally intended for a French anthropological magazine, but the publication of it had to be postponed indefinitely on account of the international war.

All the tests of muscular force—pressure of hands and traction—the figures of which are given in the succeeding tables, were made by myself during years of travel between 1885 and 1892. The instrument used was a Mathieu dynamometer (Paris), according to the instructions and with the precautions recommended by French anthropologists. Altogether 622 subjects (440 men, 182 women) were tested. They belong to North and South American Indian tribes, Indonesians, South Sea Islanders and other different peoples, the respective numbers and distribution of which are given in the following tables.

The figures of force tests of nearly one fourth of these subjects were published elsewhere many years ago, partly together with a description of their somatological characteristics.[1] As however neither an attempt at comparison of the different ethnic groups nor an analysis were made on these occasions, I will unite in the present abstract these figures with the more numerous data obtained later and elsewhere. With the exception of two albino women, a Solorese and a Tahitian, all my subjects are normal and healthy. Their presumable age varies in the main from 16 to 45 years, the majority being perhaps between 25 and 30 years old. The very few old people among my subjects are not excluded from the average numbers on the ground that comparatively their mus-

[1] "Observations anthropologiques recueillies dans la Guyane et le Venezuela" (*Revue d'Anthropologie*, 16e année, 3e série, tome II, 1887) and *Notices anthropologiques du Musée Royal d'Ethnographie de Leyde*, No. 2, Singalais, Leiden, 1886.

cular force is hardly or not at all inferior to the mean force of the younger subjects. The figures of force are given in kilograms.

The height of stature is, in most cases, based upon my own measurements. As however the height of stature of *every* subject whose muscular force was tested, was not measured by myself, in such cases the average height of the whole group as I found it, regardless of force tests, was taken. In other cases the stature was computed partly from my own observations and partly from those obtained by other anthropologists. This applies to the Iroquois, Caribs, and Australians. The figures of stature are in millimeters.

Dynamometric observations among colored races are, as far as I know, comparatively scarce, and moreover those few travelers who made tests did not always use the same kind of instrument. Among this sort of observations those of Dr. Aleš Hrdlička,[1] who used a Collin dynamometer, identical with that of Mathieu, are of particular importance and afford abundant material for comparison with my own data.

I. North American Indians

I tested the 57 Iroquois of the succeeding table on the Tuscarora reservation in northwestern New York and at Caughnawaga in Canada, both in 1886. At the former locality 4 Seneca, 1 Onondaga, and 33 Tuscarora were tested; at the latter locality 19 Mohawk. The Indians of Caughnawaga were most probably all of mixed blood; those of Tuscarora reservation were also largely mixed, but much less, and there were presumably several full-bloods among them. All the other Indians were tested in 1888, while on duty with the Hemenway Southwestern Archaeological Expedition.

In the present paper no distinction is made between the different Iroquois tribes. The average figures are those of all the Iroquois taken together. As I tested only 3 Yuma Indians, I have incorporated them here with the Maricopa, a closely related tribe. The succeeding table presents a résumé of my observations among 251 Indians of the United States and Canada.

[1] "Physiological and Medical Observations among the Indians of Southwestern United States and Northern Mexico" (*Bulletin 34, Bur. Am. Ethn.*, Washington, 1908.)

Tribe	Number of Subjects	Pressure				Traction		Average Height of Stature
		Averages		Maxima				
		Right Hand	Left Hand	Right Hand	Left Hand	Averages	Maxima	
Iroquois	34 men	53.1	49.8	70.0	68.0	—	—	1,727
	23 women	32.0	29.4	55.0	45.0	—	—	1,585
Pimas	75 men	37.6	35.0	51.0	48.0	18.0	30.0	1,695
	42 women	25.0	24.0	35.0	35.0	12.5	21.0	1,551
Papagos	17 men	42.0	38.0	54.0	52.0	21.3	35.0	1,695
	3 women	27.6	27.3	30.0	31.0	14.6	16.0	1,598
Maricopas	28 men	44.3	39.1	59.0	53.0	23.7	37.0	1,711
	16 women	31.8	26.8	45.0	36.0	15.4	22.0	1,604
Zuñis	13 men	40.4	36.1	54.0	47.0	19.0	25.0	1,644

Among these 167 men of the different tribes 19.1 per cent. have a stronger left than right hand; among the 84 women 27.3 per cent. The average difference in force of pressure between the right and left hand among all the male Indians taken together is 2.1 kg.; among all the female Indians 2.0 kg. The average difference of pressure force between all the North American men and women is 13.2 kg. for the right and 13.1 kg. for the left hand.

The average female force of pressure in relation to the male force (= 100) is 67.9 per cent. for the right and 66.4 per cent. for the left hand.

The average difference of force of traction between all the men and women (with the exception of the Iroquois) is 6.0 kg. The average female force of traction in relation to the male force (= 100) is 69.5 per cent.

II. South American Indians

The Arawaks and Caribs of the succeeding table are all natives of Surinam with the exception of four subjects from British Guiana which I tested in London and incorporated with the latter tribe on account of their small number. These are 1 Macusi and 1 Arucuna man and 2 Akawoi women, all belonging to the great Carib family. The Indians of Aguasai are either descendants of the Chayma or of the Cumanagoto tribe in northeastern Venezuela. The Guayqueries, largely mixed with white and negro blood, are coast Indians of the same region. The force, of pressure only, of these 60 different Indians may be summarized as follows.

Tribe	Number of Subjects	Pressure				Average Height of Stature
		Averages		Maxima		
		Right Hand	Left Hand	Right Hand	Left Hand	
Arawaks	16 men	38.2	35.2	55.0	49.0	1,550
	12 women	25.1	22.2	33.0	33.0	1,470
Caribs	11 men	33.2	31.7	49.0	43.0	1,572
	13 women	22.6	21.1	30.0	29.0	1,457
Aguasai Indians	4 men	36.2	33.2	40.0	37.0	1,567
Guayqueries	4 men	40.7	40.5	46.0	46.0	1,655

Taking the 35 male Indians together, we find that in 17.1 per cent. the left hand is the stronger; among the 25 female Indians the left hand is stronger in 20 per cent.

The average difference in pressure force between the right and left hand is 2.3 kg. among the men and 2.2 kg. among the women.

The average difference of pressure force between all the men and women is 13.0 kg. for the right hand and 12.9 kg. for the left.

The average female force of pressure in relation to the male force (= 100) is 64.6 per cent. for the right hand and 66.4 per cent. for the left hand.

III. Indonesians

The following tables summarize the results of my observations among 206 natives of the Netherlands Indian Archipelago, namely, of Celebes, Timor, and adjacent islands. In the first table the averages of pressure and traction for the various peoples are given; in the second table a few individual test figures.

Tribe or People	Number of Subjects	Pressure				Traction		Average Height of Stature
		Averages		Maxima				
		Right Hand	Left Hand	Right Hand	Left Hand	Averages	Maxima	
Macassars	9 men	36.5	34.8	52.0	50.0	—	—	1,615
Buginese	8 "	36.1	33.8	52.0	43.0	—	—	1,568
Timorese	29 "	38.8	35.8	56.0	53.0	14.7	27.0	1,597
	12 women	25.1	24.8	34.0	30.0	8.6	17.0	1,496
Atuli Helong	11 men	38.7	36.0	55.0	47.0	15.0	34.0	1,641
Belonese	8 "	32.1	31.2	39.0	41.0	14.7	22.0	1,619
Rotinese	32 "	38.0	34.9	54.0	45.0	15.2	26.0	1,605
	19 women	26.6	24.7	44.0	44.0	11.8	20.0	1,483
Solorese	9 men	40.0	38.2	50.0	50.0	18.0	25.0	1,577
	3 women	23.0	19.3	33.0	22.0	13.3	14.0	1,409
Sikanese	13 men	34.3	30.4	46.0	49.0	15.8	28.0	1,624
Sumbanese	29 "	39.1	36.8	54.0	52.0	16.5	25.0	1,650
	11 women	25.1	22.8	31.0	27.0	14.2	19.0	1,526
Savunese	8 men	38.5	32.5	50.0	47.0	19.0	24.0	1,569

Tribe or People	Number of Subjects	Pressure		Traction	Stature
		Right Hand	Left Hand		
Macassar	1 woman	18.0	15.0	—	1,540
Atuli Helong	1 "	30.0	35.0	5.0	1,540
Atuli Helong	1 "	35.0	34.0	—	1,690
Lionese	1 man	32.0	32.0	20.0	1,583
Endenese	1 "	22.0	21.0	8.0	1,525

Of these 158 male Indonesians 13.2 per cent. are stronger left; in 22.9 per cent. of the women (48 subjects) the left hand is the stronger. The average difference in force of pressure between the right and left hand of all the men is 2.9 kg.; of all the women 1.5 kg. On the average the difference of pressure between all the Indonesian men and women is 13.2 kg. for the right hand and 11.8 kg. for the left hand.

The average female force of pressure in relation to the male force (= 100) is 66 per cent. for the right and 67.2 per cent. for the left hand. The average difference of force of traction between all the male and female Indonesians being 4.2 kg., the average female traction force in relation to that of the male force (= 100) is 71.6 per cent.

IV. Polynesians

The first of the succeeding tables gives the averages and maxima of force test figures among different groups of Polynesians; the second contains a certain number of individual figures. The inferences however are based—as with the Indonesian—upon all the cases combined.

People	Number of Subjects	Pressure				Traction		Average Height of Stature
		Averages		Maxima		Averages	Maxima	
		Right Hand	Left Hand	Right Hand	Left Hand			
Tongans	9 men	52.7	47.5	64.0	55.0	20.6	36.0	1,772
Tahitians	11 "	51.9	47.9	63.0	55.0	18.4	36.0	1,728
	12 women	31.0	28.2	43.0	40.0	14.8	22.0	1,597
Tuamotu	5 men	52.2	50.4	73.0	63.0	22.6	28.0	1,724
Tubuai	3 "	64.0	61.6	75.0	77.0	23.3	30.0	1,725
Cook Island	4 "	46.0	44.5	55.0	57.0	16.0	22.0	1,756
Easter Island	3 "	57.0	54.6	71.0	73.0	19.0	21.0	1,743

People	Number of Subjects	Pressure		Traction	Stature
		Right Hand	Left Hand		
Tonga	1 woman	43.0	38.0	20.0	1,627
	1 "	30.0	27.0	13.0	1,660
Tuamotu	1 "	32.0	30.0	16.0	1,706
Tubuai	1 "	24.0	24.0	15.0	1,648
Half-breeds	1 "	30.0	26.0	19.0	1,604
	1 "	33.0	31.0	20.0	1,558
Gilbert	1 man	58.0	61.0	17.0	1,700

Among these 36 various Polynesian men 19.4 per cent. have a stronger left than right hand; among these 18 different women 5.5 per cent.

On the average the difference of pressure between the right and left hand is 3.4 kg. among all the Polynesian males and 2.7 kg. among all the females.

The average difference of pressure force between the Polynesian men and women is 21.9 kg. for the right hand and 21.2 for the left hand, which gives for the female force compared with that of the males (= 100) the ratio of 58.7 per cent. for the right and 57.3 per cent. for the left hand.

The average difference of traction force between the men and women is 4.2 kg. The average female force of traction in relation to the male force (= 100) is 78.7 per cent.

V. Various Peoples

This group contains most heterogeneous elements pertaining to five or six different races. The Carbugres or Carbugre Indians are a mixed breed of Indian and Negro. They were tested by me in Surinam, like the Bush Negroes. The natives of Malikula and those of New Ireland (Neu Mecklenburg), both belonging to the Melanesians, were tested at Nukualofa on Tongatabu island, where they worked as plantation coolies. The Australians, pertaining to a Queensland tribe, I tested at Hamilton near Brisbane. The left hand of the second subject showed signs of traumatic lesion. For this reason its figure of pressure, as well as of traction, are certainly far below the average. The Annamites, all from Cochinchina, are escaped convicts from French Guiana. I tested them in prison at

Paramaribo. The Hindus, plantation coolies in Surinam, where I tested them, all hailed from northern India. The Singalese were tested in London in 1886. They belonged to a troop exhibited by Hagenbeck in Agricultural Hall. Some of these are apparently mixed with Tamil. These people came from the neighborhood of Colombo and Kandy. Of the succeeding tables the first contains the average figures, the second individual figures of which latter, on account of their small number, no averages can be given.

Tribe or People	Number of Subjects	Pressure				Traction		Average Height of Stature
		Averages		Maxima				
		Right Hand	Left Hand	Right Hand	Left Hand	Averages	Maxima	
Carbugres	4 men	39.0	35.0	41.0	39.0	—	—	1,585
	4 women	24.2	24.0	30.0	31.0	—	—	1,440
Bush Negroes	5 men	52.2	49.4	61.0	57.0	—	—	1,609
	3 women	30.0	28.3	35.0	30.0	—	—	1,535
Malikula Isl.	3 men	46.3	38.0	55.0	45.0	24.3	30.0	1,563
Annamites	7 "	37.0	37.0	51.0	52.0	—	—	1,592
Hindus	6 "	33.5	30.8	39.0	36.0	—	—	1,653
Singalese	11 "	41.8	39.0	52.0	48.0	—	—	1,599
	4 women	24.0	22.2	26.0	25.0	—	—	1,453

People	Subjects	Pressure		Traction	Stature
		Right Hand	Left Hand		
New Irelanders	No. 1 man	50.0	42.0	30.0	1,508
	No. 2 "	43.0	44.0	22.0	1,553
Australians	No. 1 "	58.0	56.0	24.0	1,690
	No. 2 "	59.0	34.0	16.0	

The few inferences we can draw from these two tables are mainly the following.

Of the 44 males belonging to these various people 7 are stronger left than right; of the 7 females 1 has a stronger left hand, or, in percentages, respectively 15.9 and 14.2.

The average difference in force of pressure between the right and left hand is among the

	Carbugres	Bush Negroes	Singalese
Men	4.0	2.8	2.8
Women	0.2	1.7	1.8

The average difference in pressure between the men and women is among the

	Carbugres	Bush Negroes	Singalese
Right hand	14.8	22.2	17.8
Left hand	11.0	21.1	16.8

The average female force of pressure in relation to the male force (= 100) is as follows among those groups:

	Carbugres	Bush Negroes	Singalese
Right hand	62.0	57.4	57.6 per cent.
Left hand	68.5	57.2	56.9 per cent.

Summary of the Principal General Results

On the whole, and mostly in the average, the tallest people, tribally and individually, have the greatest muscular potency. This well-established law is, with a few exceptions, once more confirmed by my results. It should be borne in mind, however, that this fact is more the consequence of the larger hand in people of high stature than of anything else. The individual maxima of force, however, do not always correspond with the individual maxima of stature in the different ethnic groups. The maxima of force, either of pressure or of traction, are not always met with in the same subject; in other words, a certain subject may indicate the maximum force for the right hand, another for the left, and still another subject for traction.

Judging from the averages of all the various ethnic groups, the male Tubuai islanders and Iroquois, and the female Iroquois and Tahitians have the greatest force of pressure. The maximum force of traction is found among the Tubuai men and the male Maricopa; among the women the Maricopa have also the highest figure, the Tahitians coming next.

The highest percentage of left hand force prevailing over that of the right hand is found among the North American Indian women. If we take all the various ethnic groups together, we find that there are more women having a stronger left hand than men, the total percentages being respectively 16.7 and 22.5. The greatest average sexual difference in pressure force is found among the Bush Negroes

and Polynesians, with very similar figures; the smallest difference among the North and South American Indians and Indonesians, for the right hand at least, also with very similar figures.

As far as can be ascertained, the average sexual difference of force of pressure, in all the ethnic groups, is less than the average force of traction. The female force of pressure, for both hands, represents, in round figures, 62 per cent. of the male force (the latter = 100); the female force of traction, equally in round figures, represents 73 per cent. of the male force.

Compared with the average male force of pressure (= 100), the North American Indian women are the strongest, and the Singalese women the weakest of their sex in all the groups. The average pressure force of the Polynesian females, in comparison with that of the males (= 100), shows also a low figure. This latter result is contrary to expectation, the more so as the Polynesian female force of traction is proportionately considerable. The test of a greater number of Polynesians would probably give a different result.

Taking all the 622 subjects together, the female muscular potency compared, on the whole, very favorably with that of the male. This is a further proof—if such were needed—of the widespread fallacy about the bodily weakness of the female sex.

KOBE, JAPAN.

INHERITANCE BY MAGIC

By A. L. KROEBER

MODERN science has done much to study and elucidate savage psychology and reasoning, folk-ways and mores, primitive methods of thought. This essay is written as an analysis of modern scientific tendency in the light of primitive and naïve thinking.

That the idea of evolution is an old one, far antedating Darwin, is a commonplace. But it is perhaps not yet generally recognized even by biologists how truly ancient and really widespread—in fact, almost universal in the history of human thought—the idea of cosmic evolution has been.

Among the untutored and isolated natives of Samoa, one version of the story of origins begins with fire and water, who married and from whom sprang the earth, rocks, trees, and everything. Then the cuttlefish—representative of a previous order of existence, in Polynesian mythology,—fought with the fire and was beaten. The fire fought with the rocks—its progeny—and the rocks conquered. The large rocks fought with the small stones; the small conquered. The small stones fought with the grass, and the grass won. The grass fought with the trees: it was beaten. The creepers fought with the trees and conquered. The creepers rotted, swarmed with maggots, and from maggots there grew to be men. The evolutionary idea is particularly apparent in its emphasis on the factors of competition and superseding.

Among the natives of Hawaii, in a long duration of primeval night, a progressive series of eight periods was recognized, in which there appear, or literally "are born," the following in order:

First, worms, corals, shells, seaweed, kelp, sedge, grass.

Second, insects and birds.

Third, trees, jellyfish, fishes, whales.

Fourth, turtles and cultivable plants.

Fifth, pigs and human arts.

Sixth, mice and porpoises.

Seventh, visions, sounds, thoughts, and sayings.

Eighth, man.

Even this skeleton indicates the mystic elements contained in the myth; but its scientific adumbration, at least as great as that of the book of Genesis, is also evident.

The Luiseño Indians of California tell that "the first that came or appeared" were Solitariness and Emptiness. Then Being and Existence found themselves there. Then Whitish Gray and Boring Lowering existed. Then Sky and Earth were born. From them were born in order these pairs: Hair and Cane, of ceremonial significance; Basket and Throwing Stick, also of ritualistic implications; Iron Oxide and Pond Scum, used as paint for religious purposes. Then follow Water and Mud; Rose and Blackberry; Tussock Grass and Sedge; Salt Grass; Blood and Menstruation. Then came forth the hills, trees, and stones. Then followed more births: Badger; Buzzard; Ball Lightning or Meteor, a spirit; the underground Water Monster; Ghost; Yellow Pine and Cottonwood, ceremonially symbolic; Booth and Votive Offerings, also ritual; Mountain Ash; Isla, a plant; Brake Fern. Next there occurred the births of the Black Rattlesnake, the Red Rattlesnake, the Spider, the Tarantula or Tarantula-Hawk, the Raven, the Bear, and the Sting Ray, all messengers and avengers of the principal spirit to whom ceremonies relate; and finally these ritualistic objects: the Winnowing Basket; the Mortar and Stone Bowl; a Fish and Urine. These beings,—animals, plants, and objects,—later became the first people of the human species, from whom modern tribes are descended. The religious and mythological imports predominate in this story also; but a quasi-scientific evolutionary scheme of the origins of the world and life is indisputable.

To whatever part of the earth we turn, similar inclinations are apparent. The pre-mediaeval Shinto mythology of Japan, the Greek cosmogony of Hesiod, the ruder and more fragmentary one of ancient Egypt, even the crudely specialized traditions of the Australian Blackfellows, all evince a more or less complete working

out of the same thought. It underlies in a way the Hindu conception of transmigration, and has thus become a mental influence among the hundreds of millions to whom Buddhism has spread. The American Indians almost universally assume a former period when men were animals, or beings were undifferentiated between men and animals or objects; and the germ of the evolutionary idea is of course present in this assumption.

In the beginnings of western science, the early Greek philosophers unanimously took for granted a gradual development. Their search was for the substance that would result in the most plausible scheme of growth of things when postulated as primary and basic. They began with water, air, and fire; became less concrete with four elements; more immaterial still with the half abstract notions of mind, number, or being; and finally settled down to either the postulate of original ideas or original atoms. But the concept of natural unfolding, an inherent development, a "rolling out" of some sort, was rarely denied or wholly abandoned. The evolutionistic inclinations of Lucretius and his masters, random though they be, are well known; and the philosophical speculation and anticipatory scientific reasoning of the ancients, with particular reference to the development of the organic, in which they were far less interested than in that of the physical world and of man, have been thoroughly described and thoughtfully weighed by Osborn in his "From the Greeks to Darwin."

In fact, the human mind in thousands of years appears to have been able to make use of but two ideas in explaining to itself the origin of the world: that of evolution and that of creation, as it has lately been customary to name them. Both are obviously derived from analogies with concrete events which every human being witnesses constantly: the process of birth and growth, organic, and the process of making or manufacture as exemplified by human hands. Many nations have drawn on both acts in formulating their cosmogonies; some have partly obscured them by literary and ritualistic intertwinings; but in general the evolutionary idea of growth has perhaps equalled in strength that of creation. Only one people, the Jews, through their personalizing genius and anthro-

pocentric bent, turned, for a time and over a part of this planet, the balance in the opposite direction. Even in their thought there are traces of the more usual concept: the association with animals in Eden; the speaking and four-footed serpent—half animal, half man; the order of events in creation, which, though it distinctly does not fit the conclusions of our astronomy, geology, and palaeontology, does show some attempts at a successive and progressive sequence. The ramification of Judaism into Christianity and Mohammedanism, and the vitality of the principles assumed by them in common, gave to the idea of creation a fifteen hundred years' prevalence in the western world, which, as it crystallized, lent to the point of view an appearance of permanent exclusiveness long after new forces had undermined it within. But so far as human civilization as a whole is concerned, the idea of evolution, in dim or definite form, has always maintained itself in some measure and often had the upper hand.

It was then inevitable that science should sooner or later make use of this concept, just as it appropriated to itself the essentially half mythological ideas of the atom and of ether. What Lamarck did a century ago was merely to connect this age-old unscientifically founded idea with the accumulating body of organized knowledge. What he did not do, was to try seriously to explain evolution by any accurately analyzed process.

That the evolutionary concept should be specifically applied to organic life was inevitable as soon as the manifestations of life began to be viewed with appreciable interest. As long as the world, like a child in a menagerie, was content to marvel at the forms and activities of life, and to be directly emotionally impressed by them, nothing resulted but art, literature, and mythology. When examination was undertaken, some scheme was bound to eventuate.

In the day of Lamarck, the impress of observation was still overpoweringly fresh. Observations had revealed an extraordinary degree of adaptation in animals and plants. While organs and actions were merely seen, these excited surprise countless times. When they were watched, a clear relation between form and use often became manifest at once, leading to the surmise that other

as yet unexplained forms and uses might be similarly connected. The following out of such problems grew into a fascinating pursuit, particularly as every step involved an easy entry into entirely unexplored regions without a new method of procedure. It is no wonder, therefore, that the main effort of biologists of a hundred years ago was devoted to the exposition and following out of adaptations. The real interest was in these, and not in any explanation of how the forms of life came to be. Showing the function of a peculiarity of an organism still took precedence over showing how it actually originated or might have originated.

Of course, effort was not entirely confined to these recurrent revels. Lamarck certainly stressed the fact of evolution as much as possible. But what process was available to operate with? Heredity, naturally, was patent. That children usually resemble parents, that sheep bear lambs, and lions give birth to lions and not tigers, the rudest savage of thousands of years ago knew. But heredity, which maintains similarity and preserves, is in its nature opposed to the change inherent in evolution or development. It obviously gives order and fixity to the phenomena of life; it cannot in itself explain progress or alteration. Some other factor or force is required. What could this be? As always, analogy was first resorted to.

Everyone knows from his personal experience that practice makes perfect. Everyone knows that use strengthens and develops the blacksmith's arms, the musicians's fingers, the sailor's hands, the porter's back. This principle was applied. The animal that runs or butts or tears or swims, acquires or tends to acquire legs, horns, claws, or fins, irrespective of what it may have had before, just as one can see the blacksmith acquiring muscle, and the pianist spread and agility of fingers, from year to year. What can go on for ten years might go on for ten thousand, with a thousand times the effect.

And why not? No one knew anything to the contrary. No one had any ground for dispute, except from generic hostility of a theological or professional kind. As is well known, ninety-nine of every hundred educated civilized people today, with all their

having the phrase "survival of the fittest" in their mouths, still believe, unless they have had exceptional training in biology, that evolution takes place in this way. It is no wonder that the pioneer Lamarck did the same.

Of course the inevitable weakness of analogy was present. The individual is not the race. What is true of one might or might not be true of the other.[1] But it is also inevitable that purely negative reasoning does not avail against positive. One gets nowhere with it. Not until a positive scheme able to replace the existing one was provided, was there the least chance, or the least profit, in harping on the fundamental weakness of the analogy that underlay the Lamarckian explanation of evolution. It is true that for half a century the Lamarckian principles were largely ignored or denied; but they were not critically assailed.

The new scheme was provided by Darwin, and it speaks for its positive value, and its usefulness, that the man on the street still thinks of Darwin not as the propounder of a new explanation of evolution, but as the discoverer of evolution itself.

Darwin left aside, as unnecessary for his evolutionary process, the ancient idea of use development. He kept, of course, as evolutionists always must, the other Lamarckian factor of heredity. He added to it two others which had not been made use of before: first, individual variability; and second, competition or the struggle

[1] That Lamarck did not hesitate at completely ignoring the difference between the organism and the race, and that in the most unconcerned manner, is clear from his statement of his two fundamental laws in their first form, in the *Philosophie Zoologique*, part one, chapter seven:—

"*Première Loi:*

"Dans tout animal qui n'a point depassé le terme de ses developpements, l'emploi plus frequent et soutenu d'un organe quelconque, fortifie peu a peu cet organe, le développe, l'aggrandit, et lui donne une puissance proportionnée à la durée de cet emploi; tandis que le défaut constant d'usage de tel organe, l'affaiblit insensiblement, le détériore, diminue progressivement ses facultés, et finit par le faire disparaitre.

"*Deuxième Loi:*

"Tout ce que la nature a fait acquérir ou perdre aux individus par l'influence des circonstances ôu leur race se trouve depuis longtemps exposée, et par conséquent par l'influence de l'emploi predominant de tel organe, ou par celle d'un défaut constant d'usage de telle partie, elle le conserve par la génération aux nouveaux individus qui en proviennent, pourvu que les changements acquis soient communs aux deux sexes, ou à ceux qui ont produit ces nouveaux individus."

for existence. The combination of these three elements gave him his process of natural selection,—of which the more widely known phrase, survival of the fittest, is nothing but a more picturesque synonym;—in short, the means by which organic evolution works.

Darwin's achievement consisted in his combination of his three factors into a process. The strength of his position lay in the indisputability of his three factors. Heredity had always been accepted. Variability, though apparently contradictory of heredity, and although still unexplained as to its origins, was equally universal and undeniable. And that competition does and must take place on an enormously important scale, is equally plain. Hence the Darwinian explanation, once the relation of the three factors was made, was unassailable. We can limit the applicability of the explanation; we can find cases which it can be made to fit only with difficulty; we can, and probably shall, find other processes which are also operative; but the world must probably forever believe that natural selection is of some influence in the shaping of life. And Darwin from the whole bent of his mind was not trying to give a history of life, which would unquestionably have been attacked and destroyed at multitudinous points, but to demonstrate the applicability to this history of a universal formula.

Hence it is not remarkable that Darwin, while not seriously employing the older pseudo-process of Lamarck, refused to break with it. With all his originality he was essentially sane with the conservatism of balance; he was producing, not clearing; and the older explanation was not in his way. There was room for both. Darwin's work was to make evolution tangible by proving natural selection. He would have left his course by trying to disprove use inheritance.

At the same time, the world could not always occupy his aloof position. When the fight was over and the principle of selection accepted, the house of science had to be put in order. Two diverse explanations, with nothing in common but the assumption of heredity, were in each other's way. They left an uncertainty which either alone did not produce; and they were bound to irritate as everything which confuses irritates. The next generation was called

to choose between them. Selection, although the full extent of its applicability may be undemonstrable, was certain. It was also new. The older explanation of use inheritance was therefore due for a hostile examination. The only surprise now is that the attack was so long deferred.

It was Weismann who led the onslaught. The destructive nature of his achievement, a stiffness in constructive theorizing, to which he felt impelled, but which resulted only in barren formalities, have led to an undue disrespect for his name which is perhaps strongest among his biological colleagues who can appreciate his technical shortcomings. Without the greatness of Darwin, and an extremist, he was however on fundamentals as clear a thinker as Darwin; and his accomplishment will in the end be rated in proportion. He was the first to take a step that had to be taken.

At the very touch, the Lamarckian structure proved to be absolutely hollow. Experiment failed to produce even a scrap of positive evidence in its favor. Renewed examination demonstrated that there was not a single alleged instance which was more than logically possible. Practically every case of use inheritance was explicable by selection. The case for it came down to the condition so graphically depicted by Ball: "Are we to conclude that use inheritance *plus* selection will modify races, just as Voltaire firmly held that incantations, together with sufficient arsenic, would destroy flocks of sheep?"

Weismann died since the preceding pages were first written. What has been the effect of his career? Superficially, very little. To the world at large he is a second magnitude, a disputative follower of Darwin and opponent of Spencer without the popularizing ability or fame of Huxley and Haeckel. To biologists he is an ultra positivist, who argued with clearness one side of a question which they have grown tired of, and otherwise built up certain theories which scientific manners at times require to be mentioned, but which are singularly thin, unplausible, and barren. And yet his basic idea, that the hereditary substance is totally distinct from the organic body, and that therefore the fate of the individual cannot affect the race, has found the strongest corroboration in a

new branch of biological science whose origin has no connection whatever with the current of thought of which Weismann formed part. If Mendelism rests on anything at all, it rests on the doctrine of the utter separateness of what it calls gamete and zygote. This separateness may be purely conceptual, but it is the only concept which it has yet been possible for anyone to think out that will explain and hold together the looming mass of facts heaped up by genetic observation and experiment. There is an impression among some Mendelists that the greatest accomplishment of their science has been the superseding of Darwinism. With Darwin the ultra-Darwinian Weismann of course would fall too; and this school may not relish any one's believing that one of their fundamental achievements has been the involuntary confirmation by real knowledge of an idea first clearly grasped by a Darwinian theorist. But if the principle of the distinctness of germ and body is basic to Mendelism, it is basic also to Weismannism; and to this extent the newer science has vindicated Weismann.

There was a time not so long ago when many sensible people still thought it desirable to try to prove that the findings of geology and biology were reconcilable with the view that this earth had its beginning in 4004 B.C. At present it is no longer considered profitable even for intelligent clergymen to make this attempt. In fact the best form demands a downright admission, or at most a more or less dignified evasion. What has brought about this change? Certainly not argument. In countries where education prevails, the majority has gone over; and the majority of professional ministers of religion to the educated have had to go over with them. The question in fact is not arguable any more. Whoever wishes to stay with the belated minority, is at liberty to do so; and there is the end to it. No person of understanding with anything else to do will argue the point, because it is plain that whoever believes in the literalness of the Old Testament does so because he wants to and not because the preponderance of evidence forces him that way. On the other hand, once anyone has this predilection, it is childishly easy for him to find arguments in favor of his case, and to emphasize that the evidence against him is not

absolutely complete—as of course it never is against anything. Therefore the recognition that discussion of the subject is no longer fruitful.

It is much the same with the "problem" of use inheritance or acquired heredity, so far as profit is concerned. Whoever falls back on the evidence and the possible ways it may be interpreted, can chase his tail around till doomsday. Many biologists now realize this and refuse very carefully to be drawn into any discussion of the subject. But their motive is different from the reason that keeps them from letting themselves be troubled by the claims of 4004. That is a plain superseded superstition; but acquired heredity is not yet a superstition, it is only a tiresome noise which is taboo in much really high scientific society: just as many perennial social problems are taboo in good social circles not because they are antiquated but because they are disagreeable.

The result is that instead of heredity by acquirement being actively frowned upon and stamped out as a pernicious heresy, it is evaded; and the consequence of this convenient shutting of the eyes is that whenever a biologist is mentally youthful, or temperamentally belated, or over-conscientious, or inefficient from overcatholicity, or just plainly muddleheaded, he always sooner or later innocently and earnestly discovers this undisposed of mass of refuse that everybody else has been throwing out of the back window in order to keep the living room clean; and he runs serious risk of endeavoring to haul it back again in the belief that it is or contains something valuable. Of course he gets more shrugs of the shoulder than enthusiastic visitors. But the reason of the disapproval accorded him is not the entirely good one that the mess he is dragging back in is so dangerously unhealthy that it ought to be buried or burned once for all, but the very bad one that it smells so stale that no one wants to come near it.

In short, the attitude of biologists in general on this problem of acquired heredity is far from satisfyingly vigorous, and when they avoid its further discussion it is not because the problem is settled but precisely because it is unsettled and long unsettled. Scarcely anywhere since Weismann is there any zeal against the

doctrine of acquired heredity as something radically and vitally and destructively wrong. Biology has plenty of fires lit for the unbeliever in some of its principles, as witness the eugenics propaganda; but it scarcely professes a cardinal article of faith on acquired heredity. What brings it about that there exist so much weak condemnation, half tolerance, and hankering?

There are two reasons. The first is the unsolved explanation of the origin of variations. That variations constantly occur no one has denied. But how new variations come to be; how selection operates to preserve them for the future benefit of the race, while they are still so rudimentary as to be functionless and unserviceable; how, unless selection were practically unfailing as regards every individual, new slight variations could be maintained and increased in the face of free interbreeding; these were serious and justified questions that arose soon after the original Darwinian theory was launched. There is no doubt that if use inheritance existed, we should have a much simpler, more natural, and more convincing explanation of evolution, in many cases, than human ingenuity has yet been able to give with the principle of natural selection. Hence it is no wonder that the Lamarckian theory was revived twenty or thirty years after the publication of the "Origin of Species" by several eminent biologists who could not be accused of old-fashioned orthodox hostility to the Darwinian doctrine, but who realized its limitations. It is also of note that these men were in the main not dealers in general speculation, but close students of palaeontology or some other branch of the history of life; and that they were driven to their stand by the difficulty of understanding, in terms of natural selection alone, actual phenomena before them, and not by original preference for any other theory. The conviction of these students is summarized in a clear statement of the situation made long ago by Professor Osborn: "Upon Weismann's principle we can explain Inheritance, but not Evolution, while with Lamarck's principle and Darwin's Selection principle we can explain Evolution, but not, at present, Inheritance. Disprove Lamarck's principle, and we must assume that there is some third factor in Evolution of which we are now ignorant."

This, incidentally, is as true today as it was twenty-five years ago; and it is our continued ignorance of this third factor that still drives some true thinkers into adhesion to the Lamarckian principle as the only available substitute.

More recently the extraordinary discoveries in Mendelian heredity have again made clear that the origin of variations or mutations is an utterly unanswered question, and far from being so simple and self-assumable a thing as it seemed to Darwin and the early Darwinists, that it is a most vital problem of bearing on all evolutionary views. But this is a new conviction; the frequent tolerance toward acquired heredity is older; and even if the Mendelist falls back on use inheritance, it furnishes him, to date, only with a possible key and not a certain one, since the absolute distinction between gamete and zygote which is the kernel and essence of all the new unit heredity seems contradictory of any possible understanding of use inheritance as a process, and leaves it an empty name.

Hence the explanation that might be given, that biology is often indifferent and occasionally even friendly to the unverified and challenged theory of acquired heredity, because the science is unable to discover any other way of accounting for mutations, is mainly a technical explanation, and therefore not a valid one.

For that matter, the average man, educated or uneducated, is firmly convinced of acquired heredity and neither knows what mutations are nor bothers his head about the cause of variability. Now when the leaders of thought and the mass of men agree on a new doctrine, such as perhaps eugenics, it is pretty plain that the mass is following the leaders; but when the doctrine is age-old and therefore necessarily rooted in common ignorance, it is equally plain that the leaders are still traveling with the mass because they have not separated themselves from it; and we can therefore deny them the claim, on the particular point in question, of possessing the wisdom of the elect. At best, they are only falling back upon semi-superstition in default of anything better.

A second reason, then, and not the foregoing explanation, is the general cause of the biological reluctance against a final and definite divorce from the assumption of acquired heredity. It is this.

There is another evolution, distinct from the evolution of organic life, in which use modification is permanent and transmittal of the acquired exists. These two evolutions, although dissimilar in their material and unconnected in process, are analogous enough in their results to have remained undistinguished in the less discriminating days of the past. They are still not separated in the public mind, which always in its bulk is the mind of former periods. And while biologists in general may formally admit the duality of the processes, the controlling majority of them, at least, have not yet made the distinction an active enough part of their mental equipment to put it to consistent use.

This other non-organic process of evolution is that of civilization, of human accomplishment. Speech, knowledge, arts, learning, and all our activities except the bare substratum of physiological abilities, are not inborn. Heredity gives us the slate and the pencil in good working order. Our individual kinds of slates and the sharpness of the pencils are also wholly from heredity. But with the writing on the slate, which is the part we play in civilization, heredity has nothing to do. That comes from social situation, in other words the existing civilization into which we are born.

Now organic evolution, which cannot work except through heredity, is not an accumulative process. The recapitulation of past descent in the early stages of individual existence is so tremendously abbreviated and condensed as to be unimportant even to the individual. Nor does this recapitulation increase and become more consequential with the progress of organic evolution. On the other hand, social evolution is not only essentially but absolutely an accumulative process. We write the Roman alphabet not because we are born with the ability or because our parents were born with it, but because the art is given to us by them as it was given to them by their predecessors, who in turn based their knowledge upon the accomplishment of nations that wrote consonantally or syllabically, while back of that presumably lies word writing, then idea writing, then picture writing, then plain pictures.

Accumulation is not always the most conspicuous trait of the process of civilizational evolution; because the accumulation is

often so slow as to be imperceptible except to the historian, or sometimes so remote as to have been forgotten. Such is the case with human speech. But even in such instances there are other criteria that mark the products of this evolution off from those due to organic evolution. Our speech is not instinctive like the bark of the dog or the song of the birds, but learned. It comes to us from the outside, that of animals from within. We acquire our so-called mother tongue as readily and as perfectly from a foster mother as from the zygote that produced one of the two gametes that made us; the non-human animal derives and can derive its language only from the zygote of which it is a bud or from the two zygotes of which its originating gametes are sprung. All that our actual parents give us is the faculty of speaking. The words, the idioms, the grammatical processes, the associated ideas, we derive from them not as parents but as members of a social group of which they happen to form a usual but perfectly accidental part.

As this social group develops anything new in its civilization or acquires any modification of its social activities, we and our successors acquire it too. Use inheritance is therefore strictly true of social evolution. It is precisely the method by which this evolution takes place.

It is also a fact that organic and social evolution evince a number of surprising analogies. The growth of life, both in the whole and in the individual, is remarkably similar in superficial appearance to the growth of civilization. But it is obvious that the processes by which these two growths take place are fundamentally different, unconnected, and even in a sense opposite.

Now every biologist and every sociologist knows this distinction. But even great biologists and great sociologists have forgotten it. Lesser ones forget it daily even now. And the unprofessional public, except in cases of rare native sense or profound mother-wit, does not of course even know that there is a difference. As little did former ages realize that the process mattered. To them, too largely, whatever was transmitted from the past was inherited. The very word which we still use to express the process of organic transmission, "heredity," refers originally to social transmission.

"Haeres" is an heir—a nephew or a father as the case may be, as readily as a son. Biologically we do not inherit from uncles or sons; and the use of the term heredity to denote organic inheritance could have taken place only in a time when the difference between this process and that of social inheritance was veiled by the outward similarity of their effects, and when its significance was not yet perceived and made use of.

Everyone knows that a million dollars however lawfully inherited are not a unit character. Even a layman will admit that we do not inherit a coat of tan from a grandfather. But on the other hand, when the conditions are sufficiently stretched to be tenuous and vague, when the elements of knowledge become vanishingly small in the haze of unavowed ignorance, even scientists revert to naïve methods of thought, and cheerfully assume or gravely argue that a fair race will turn black from tropical exposure of continued generations, and that the acquisition of greater wealth or learning or skill by one group is evidence of a superior faculty for such acquisition inborn in that group through organic heredity. In the whole matter of difference between nations, castes, or social groups, biologists as a class are still amazingly primitive mentally. Instead of inquiring whether there is any relation whatsoever between these social groups and the organic species and races with which they themselves are wont to deal, they take identity for granted and then proceed to explain phenomena of social evolution by processes of organic development.

Historians have not been quite so crude: but they deserve no credit for the fact. The reason is not that they have discriminated more clearly, but that history is older than biology. Man's interest is first in himself, only secondly in nature. Hence in ancient times and in half-civilized forms of society it is rather organic phenomena that are explained by social processes when they are explained at all; and the historians of the past, perhaps, have lapsed into fewer errors than biologists, not because they understood man better but because they were not at all interested in the animal.

The modern historian is sometimes still as innocent as his predecessors, though fashion requires him to appear more learned.

But the sociologist of today has an avowed goal, and must make himself a program; and only too frequently a lack of imagination leaves him no resource but to pick up the tools of the biologist and set to work blindly. It is true that one profession contains no more ability and no more incompetence than another. But as times progress, the chances of achievement, or the opportunities for error, alter.

Biologists have such a fatal opportunity now; and many of them have stepped into the trap. History, except in what it professes, is very much where it stood two thousand years ago. But biology has been born in the last century or two. It has forged its weapons, taught itself their use, conquered a territory, and stands forth a young giant of prowess. What wonder that it has proceeded by the divine right of power to annex the antiquated realm of history that lay adjacent, and to impose its rule and laws without inquiring whether they were fit? The greater fault is not with the biologists who have explained historical phenomena by organic processes, but with the sociologists who have accepted and welcomed these alien explanations.

The degree to which biologists and those infected with biological methods of thought deceive themselves into believing that they are resolving social phenomena into organic factors is truly astounding. In the matter of the facultative equivalence or identity of the human races, as already mentioned, the average biologist assumes his answer, instead of defining his problem, as blithely as an ignorant person. Some write with confident optimism on the biological status *and* social worth of hybrid races, and no voice is raised. But let a historian, or theologian, or any one else discuss in one breath the infallibility and the specific gravity of the Pope, and he will be set down as literally insane.

The entire doctrine of eugenics is an endeavor to attain moral ends by biological means. Moral of course is social; and yet the open protests have come—strange partnership!—from the orthodoxly religious and the professedly skeptical, but rarely from the enlightened camp of science. Not the educated thinker but the uninformed man on the street raises the valid objection—and it is

not only valid but perhaps the only one that counts,—that eugenics is right enough for hogs but not for men. We have, indeed, come almost to the point where the learned try to forget, and only ignoramuses remember, that while men are animals, animals are not men, and that however much a human being may have of the nature of the pig, he nevertheless has one thing that no pig ever had, namely the faculty for civilization and hence for morality, to use an ancient term.

Darwin a number of times cites traits or habits of savages as if they might be indicative of transitions between civilized man and the other higher animals. Such confusion of perception as he may be guilty of, is however not seriously material. Darwin was an explainer of the organic, and avowedly not a historian of the social. If in buttressing his views he was occasionally deceived by an analogy and adduced as argument an instance that neither rests upon heredity nor has anything to do with the evolution of life, such slips do not weaken his case nor detract from his fame, especially as his utterances on such points are regularly tempered by a wise restraint of statement.

It is another and more vital failure, when we of today, biologists, sociologists, anthropologists, and sometimes historians, with fifty years of advantage over Darwin, we to whom organic evolution is no longer an ideal doctrine to be justified to the world but a foundation from which we are building, are guilty, often in an exaggerated degree, of the inability to discriminate the two forces involved. There is nothing that reveals more illuminatingly the intrinsic greatness of Darwin's mind than a comparison between his infrequent inclinations to lapse in using a social fact to drive home an argument for organic evolution—lapses in which moreover he almost always leaves the door open to a truer judgment,—and between the thin, meaningless edifices of empty theory that it is the fashion today to rear in mistaken imitation of the master and under the misleading name of "explanations" of "social evolution."

Such attempts as these may be pardoned when they come from orthodox Socialists whose aim is not truth but political propaganda. But it is difficult to accept with tolerance the numerous professedly

scientific books that disguisedly or openly rest upon the fallacy that the social is organic. Restraint of expression against this flood is difficult, particularly since from the very beginning there have been voices of warning, notably from the codiscoverer of the doctrine of natural selection.

Wallace in his later years lost much of his credit in scientific quarters by his undiluted espousal of spiritualism, phrenology, and other dishonored causes. It may also be doubtful whether his assertion that the organic factor of selection does not apply to man as it does to animals, was due in greater measure to an actually keener perception of the difference of the social from the organic than Darwin possessed, or merely to greater inclination toward orthodox theological separation of the human soul from the living body. But whatever the impelling motive, he made the distinction; his name carried weight; and subsequent heedlessness is therefore without justification.

The profoundly imaginative nature of Galton was less preserved toward balance on this point than the temperament of his cousin Darwin. In "Hereditary Genius" Galton shows that as between individuals mental faculties are inherited in the same ratio and degree, and therefore presumably in the same manner, as physical traits, which is reasonable as well as convincing. But it is an entirely uncompelling inference when he then proceeds to explain the diversity between the attainments of social groups such as ancient Athenians, modern Englishmen, Africans, and Australian natives, as due to differences between the average inherited faculties of the bodies of men carrying the civilizations of these social groups. He is still less convincing when he expresses these differences quantitatively—only every twelfth Britisher, four hundredth negro, or four thousandth Blackfellow attaining to the inborn mentality of the every day normal Athenian of the time of Pericles. It is inference of the same sort that leads him to the conclusion that on the scale upon which the Athenian surpasses the Australian by five intervals, the dog, in memory and power of reason, stands below the human race by eleven intervals, and apparently below the Australian by only eight. Of the same type is the reasoning which

ascribes the alleged poverty of Mediaeval civilization—entirely overlooking its great accomplishments, by the way,—to the distinctively selecting influence of the celibacy practised by many of its best minds. Such views are utterly untenable except on the preconception that social forces as such do not exist and that social phenomena are all ultimately, and in general directly, resolvable into organic factors. What other psychology than this can we attribute to Galton when he makes the astounding statement that in his belief the rapid rise of new colonies and the decay of old civilizations is mainly due to their respective social agencies, which in the one case promote, and in the other retard, the marriages of the most suitable breeds? In other words, social agencies may be nominally admitted, but they affect society through their organic operations!

With Galton descending into these crudities, it is no wonder that many lesser men have sinned as deeply, though their more pallid intellects have vaguened the fault.

Weismann's hostility to the belief in heredity of the acquired might be expected to have led him intuitively to an unusual power of discrimination of the organic from the social. This is a fact. His essay on the Musical Sense, for instance, is a startingly keen and sound analysis of the difference between heredity and tradition, between faculty and achievement. He realizes fully that a Mozart could not have done Mozart's work in another social environment, such as that of the Australian Blackfellows, and his realization is supported by authentic reasons. Up to this point no more rigid adherence to true sociological method could be asked of a pure historian. But at the very end of the essay, when one expects the final logical step and the pronouncement that the Australians undoubtedly may have had their Mozarts, in short that life and its processes are one thing and civilization and its agencies another, the force of association asserts itself, the professional evolutionary biologist reappears, and the argument is lamely hastened to the inconsequent conclusion that faculties are probably different after all. The work remains a brilliant miss, splendid in its display of the rigorous clearness which was Weismann's basic strength; but it is a miss nevertheless.

It must once more be asserted unconditionally that it is not to be inferred from these examples that biologists are any worse reasoners than students in other departments of knowledge. Chemists do not feel impelled to expound the rise of genius in chemical terms or to explain the variety of moral codes by valences and atomic weights. They therefore leave civilization alone, or if they pronounce judgments in its field, do so avowedly as laymen. But biologists view the province of the social from their very doorsteps. They are dazzled by the remarkable parallelism of the growth of the social and the organic; and they have therefore normally been driven by ambitious enterprise, and often by a sense of duty as well, to invade the fertile and universally interesting realm of human history.

It would then appear that belief in acquired heredity is merely a result of the failure to distinguish between social and organic processes, and a remnant of the ruder vision of former times when heir meant both a descendant by reproduction and the inheritor of possessions. If heredity by acquisition is still taken seriously by many earnest students, it is not because the evidence compels them, but because they make evidence in behalf of what they want to believe, just as all men in all matters tend normally to believe what is most satisfying and then to find corroborative arguments. The theory of acquired heredity is at the present time almost as belated a survival as the popular doctrine of prenatal influence which maintains itself with similar vigor in the face of every scrap of unbiased evidence. Both are processes of thinking which if found in the minds of uncivilized people would be described as belief in sympathetic magic. When the peasant woman wraps a round hard stone in linen and then goes home and bakes pancakes in order that her cabbages may be firm, white, sound, and large-leaved, the resemblances of fact which she has in her attention are true enough. She only fails to inquire if there is any possibility of the involved processes of causality being also identical. When a child is born with a flame-shaped red birth mark a few months after the mother has witnessed a conflagration, the average European is correct enough in his observation of a similarity of the

phenomena. Only he fails to inquire whether there is the least chance that there may be a mechanism through which one event can become the cause of the other. When the reasoner infected with biological ideas or the habit of over-hasty social generalizing sees in the growth and decay of a nation nothing but the multiplied life-cycle of an organism; or when he notes the parallelism between men accumulating the inventions of their antecessors, and species of animals in new circumstances adding new organs or faculties to their previous traits; the analogies his mind dwells on are undeniable. But when he asserts the same cause for both sets of phenomena, his explanation is uncritical and not far from supernatural. This is as true when he is a sociologist and accounts for phases of civilization by innate racial heredity or by the selection of imported malaria, as when he is a biologist and resolves organic evolution even partly into a process which is merely a made-over adaptation of the process of racial transmission.

When this point is once grasped, and the distinction between the forces of life and the forces of civilization is courageously adhered to, the eyes see a new world. There is no longer any problem of acquired heredity nor any possibility of a problem. To refute it becomes as wasteful, and as encouraging of superstition, as to argue scientifically about the sacredness of seven or the harmony of the spheres. Sensible and reverent people today bury their dead; they do not discuss whether the embalmed mummy may not after all maintain some kind of an existence. Least of all do they want it around the house, or even stowed away in the attic.

The great mass of biologists are absolutely right in refusing to consider any further the question of acquired heredity. It is only the motive for their refusal that can be challenged. Too often it is not that they have seen light, but that their spirit is weary.

The old tiresome problem then is insoluble because it is no problem. It is justified to refuse to consider it farther, and proper to disregard all alleged and tempting evidence in its favor, as all evidence springing from motive is discredited in advance.

Biology and history can join hands in alliance across the gulf that separates them. The students of life can even derive help

and profit from the students of human achievement. They can learn from them what acquirement is and how it is transmitted. Once it is identified, they will expel this alien incubus upon their work. They will limit their authority to what they can naturally subdue and govern. They will rid their science, which in every aspect revolves either closely or remotely about heredity, of an essentially non-hereditary and even anti-hereditary factor, and will then be free to explain the organic basis of history by purely organic causes, leaving the explanation of history itself, so far as one may be possible, to the historical methods of historians. If biologists neglect to take this stand, scientists of the social will in the end revolt violently against their authority and attain their own separateness by force. Under a wise and natural segregation, not so much of extent as of method consistently upheld within the demarked scope, each study will work out its independent destiny justly and intelligently, until the future gives them new contacts and new bonds.

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HOLDING BACK IN CRISIS CEREMONIALISM

By ELSIE CLEWS PARSONS

BY crisis ceremonial I mean ceremonial to signalize or allow of the passing from one stage of life to another, what Van Gennep calls "*rites de passage*," what the Greeks called *têlêtē*, the putting off of the old, the putting on of the new—adolescence or initiation rites, marriage rites, funeral rites or mourning.

In the interpretation of crisis ceremonialism I am suggesting, there are two main features, related features, for both refer to what I take to be the characteristic attitude of primitive culture towards change, the attitude that change can be ignored—up to a certain point—and controlled—within a certain degree. Through ceremonialism change is ignored, *i. e.*, it is not met as it occurs and it is controlled, *i. e.*, it is made dependent on the ceremony, established and disposed of ceremonially.

The desire to put off meeting change may be considered, I suppose, as an expression of the pull of habit. As for the desire to have a say about it when it is inevitable, and to make out that it is under group control the Freudians will tell us no doubt that here we have a patent manifestation of the group's will to power.

At any rate the particular feature of crisis ceremonial I wish to discuss, its features of reluctance, of holding back, may be taken as an outcome of the pull of habit, actual or conventionalized, an outcome too, which is tolerated or encouraged because it increases through resistance natural or simulated the group's sense of power.

What display of resistance or of reluctance is there at initiation? I will give a few instances:

In Central Australia preparations for the initiation are made unknown to the lad to be initiated.[1] Then frightened when hands are laid upon him, he struggles to get free. Similarly in Queensland

[1] Spencer, B. and Gillen, F. J. *The Native Tribes of Central Australia*, p. 219. London and New York, 1899.

a girl is decoyed away from camp, ambushed and then operated upon despite all her shrieks and entreaties.[1] Indeed in every Blackfellow tribe the initiate or adolescent, boy or girl, is regularly taken by surprise and subjected to force. In the New Britain ceremonial, a coil of shell-money is thrown over the initiate's head, to placate him it is said. If he succeeds in breaking away from his captors before the coil is thrown, he is allowed to escape. The next time he is caught and breaks away it is etiquette for him to try to kill his pursuers.[2] In this connection there is a reference to the attitude of the Banks islands initiate perhaps worth citing. "One day," Dr. Rivers puts it, "one day John would say to Mark [his nephew], 'I will now make you *sukwe*'. . . . This would make Mark sad, for he would know that he had not enough money for the purpose and he might even refuse to accept his uncle's proposal."[3] Is it not possible, I suggest, that Mark's sadness and hesitation have other causes? We may note too that in the native speech to the neophyte Rivers transcribes, the neophyte is regarded as having been *sulky*.[4]

On the part of an initiate's kindred, particularly his kinswomen,[5] resistance and reluctance are also displayed. Narrinyeri initiates are seized upon at night by the men. The women resist or pretend to resist, pulling back the captives and throwing firebrands at the captors.[6] In the Port Lincoln district after the initiate is seized the women are forced out of their shelters to shout and lament as if in deep grief. Their fears, it is said, are ceremonial.[7] In the

[1] Roth, W. E. *Ethnological Studies among the North-West Central Queensland Aborigines*, p. 174. Brisbane and London, 1897.

[2] Danks, B., in *Journal Anthropological Institute*, XVIII (1888–9), p. 286–7.

[3] Rivers, W. H. R. *The History of Melanesian Society*, I, 64. Cambridge, 1914.

[4] *Ib.*, I, 102.

[5] Part of the feelings of the women is no doubt grief over the more or less permanent separation of the boys. The lifelong separation of the sexes is begun at initiation and no doubt ceremonially accentuated.

By one engaged in proving that women are more sentimental than men, more reluctant to face the facts of change, their attitude at initiations and in other crisis ceremonials merits attention.

[6] Smyth, R. Brough. *The Aborigines of Victoria*, I, 166. Melbourne and London, 1878.

[7] *Ib.*, I, 67.

Mita-Koodi tribe throughout the first night of the initiation the women are supposed to wail.[1] In the Euahlayi tribe the old men bring in presents of food to the initiates' kinswomen to comfort them, telling them that spirit women are the givers.[2] A Yaroinga initiate is decorated with white and red feather down and white feathers for his head. When his father and his mother's brothers first gaze upon him in this get-up they begin to weep and the better to express their grief they besmear themselves with grease and ashes.[3] The morning after the Andamanese initiate breaks his turtle fast his kinswomen come and weep over him.[4] In the Western islands of Torres straits when the boys' families see them for the first time after their month's absence all but the boys themselves set up a howl, fathers included.[5] In the Bismarck archipelago kinswomen lament and scream on the occasion of initiations.[6] When a Banks island initiate leaves his kinswomen they cry as if he were leaving them for a long time.[7] A Tikopia boy is incised when he is about twelve years old. During the operation his relatives weep, the men cutting themselves on the forehead, the women tearing their cheeks with their nails.[8]

The initiation of offspring marks among several peoples the entrance of parents into another age-class. Ceremonial expressions of reluctance to be promoted among the elders appear to be scant, perhaps because the privileges of seniority in early culture are so great. To our formulas for the occasion—"I hear your boy is entering college. What an old fellow you must feel," or, "My

[1] Roth, p. 173.

[2] Parker, K. L. *The Euahlayi Tribe*, p. 59. London, 1905.

[3] Roth, p. 172.

[4] Man, E. H., in *Journal Anthropological Institute*, XII (1882–3), 131.

[5] *Reports Cambridge Anthropological Expedition to Torres Straits*, V, 211. Cambridge, 1904.

[6] Parkinson, R. *Dreissig Jahre in der Südsee*, pp. 582–585. Stuttgart, 1907.

[7] Rivers, I, 101. Confined in the *salagoro* in old days it not infrequently happened that they never did see him again. Dr. Rivers believes, however, that the wailing is part of the conception of initiation as a ceremonial death. (*Ib.*, I, 127). Belief thus explicit may be held, but it is not necessary, to explain the mourning. The wailing is quite adequately accounted for by the diffuse feeling that the boy is setting forth in life.

[8] Rivers, *Ib.*, I, 312.

daughter is coming out, it makes me feel like an old woman," to such formulas of regret I find but one analogue. A Masai may not be circumcised and qualified for the warrior class until his father has observed a ceremonial called "the passing of the fence." After four days of isolation, as the father is passing the fence, he is addressed by an elder: "Go, become an old man." He replies: "Ho, I shall not!" Four times the order is given and four times objected to. The fifth time, the father answers: "Ho! I have gone then." [1]

In marriage ceremonial the observation of resistance and reluctance has been closer and fuller. Much of it has been compiled too—to illustrate or prove the existence of marriage by capture and its survival in the so-called rape symbols. It is not good proof for the most part for that historic speculation just because it does illustrate the theory of marriage as crisis ceremonialism. The resistance or holding back is generally an individual display of the bride, often against her own people, and when her kindred do resist or hang back it is the women rather than the men of the family who are most assertive. Other circumstances also suggest that the "capture" is merely of the girl herself, and not of the girl away from her people. The capture may be connived at by her family or even planned for. After it she may be taken back to her home for the subsequent part of the ceremonial, or even to live there for a period. Again in widow marriage the "rape symbol" may be dropped out—just as one might expect in the case of a rite to express reluctance against a novel relationship, but not to be expected if the loss of a woman to her family were the idea in mind.

Bridegroom as well as bride may show reluctance and in ways too that are a droll commentary on the much discussed theory of the "rape symbol."

Among the Roro-speaking tribes of New Guinea when the bridegroom sees the bridal procession coming, he hides in the *marea* or clubhouse. The village youths drag him forth, and disregarding his protests, having painted and decorated him, bring him to his father's house. Here he is made to sit down near the bride.

[1] Hollis, A. C. *The Masai*, p. 295. Oxford, 1905.

Neither pays any attention to the other.[1] From his place among the bachelors the Andamanese bridegroom has also to be dragged away. When the chief or elder approaches him he at once assumes a modest demeanor and simulates the greatest reluctance to join his *fiancée*.[2] In the Eastern islands of Torres straits the bridegroom pretends to be greatly ashamed, hiding his face.[3] Among the Chukmas of India, as elsewhere, feeding each other is one of the rites expected of the bridal pair. A Chukma bridegroom as well as bride is very bashful over it, and to the hilarity of all present the best man raises the bridegroom's hand to the bride's mouth.[4] Among some of the Garo tribes the girls propose and it is customary for the man who receives a proposal to run away and hide. His friends search for him and bring him back to the village by force. He escapes to be captured a second time, but if he runs away for the third time it is assumed that he is in earnest and he is let go free.[5] For five days a New Britain bride stays alone in the bridegroom's house, while he hides away in the forest or in some place in the high grass known only to the men.[6] Among the Abschasses of the Caucasus the bridegroom runs away and hides on his wedding night, to be brought back by force the following day.[7]

The analogous behavior of the bride is far too well known to need particularization. But to one of the methods in use to overcome her reluctance I would draw attention, the method of bribery. Almost as misleading to the ethnographer as the tag of "rape symbol" has been the tag of "bride-price." Any present on the occasion of a marriage he puts down as part of the purchase sum signalizing a marriage by purchase. Whether the presents are

[1] Seligmann, C. G. *The Melanesians of British New Guinea*, p. 269. Cambridge, 1910.

[2] Man, p. 137.

[3] *Report Cambridge Anthropological Expedition to Torres Straits*, VI, 113. Cambridge, 1908.

[4] Lewin, T. H. *Wild Races of South Eastern India*, p. 178. London, 1870.

[5] Playfair, A. *The Garos*, p. 67. London, 1909.

[6] Danks, pp. 286–7. Cp. Parkinson, pp. 65–6. After two or three days the bridegroom begins to pay a daily visit to the bride, she giving him a meal. Then he may go with her to her field work. After some weeks he builds a house and the first night the couple spends in it the marriage is considered to be finally contracted. See p. 51.

[7] Seidlitz, N. V. "Die Abchasen." *Globus*, LXVI (1894), 40.

made before the wedding, during its celebration or afterwards, whatever their nature, from a lock of hair or a bunch of flowers to a pig or a diamond tiara, whether they are made by the bridegroom or his family or friends or by the bride or her family or friends it makes no difference, they are all likely to be accounted for as a bride-price or derivatives at least of a bride-price. In this welter of wedding-presents may be distinguished, I think, presents that appear to be, far more than a compensation, a bribe, a short-cut to overcome the reluctances, sometimes of the bride, sometimes of kindred, to enter into or envisage the new relationship or the new stage of life.

Among the Zambales Negritoes during the *leput* or ceremonial home-coming of the bridegroom with his bride, the lady squats down on the ground from time to time and refuses to budge until she receives a present.[1] A bride's conduct in Uganda is similarly contrary. Carried by the bridegroom's retainers she is set down at his threshold. There she balks until the bridegroom comes out to give her cowries. Indoors she declines to sit down and make herself at home until she gets another present of cowries. Later still another present has to be forthcoming to induce her to eat.[2] In Fiji the presents the weeping[3] bride receives from the bridegroom's party are actually called "drying-up-of-the-tears," *vaka-mamaca*.[4] In the account George Sand[5] gives us of the wedding practices of Berry, a district in the heart of France, the French bride is quite as unmistakably bribed as the Fijian. Barred out, the bridegroom's party sing to her:

> "Ouvrez la porte, ouvrez,
> Marie, ma mignonne,
> *J'ous* de beaux cadeaux a vous présenter
> Hélas! ma mie, laissez-nous entrer."

And then the song goes on to specify all the charming things they

[1] Reed, W. A. *Negritoes of Zambales*, pp. 59–60. Manila, 1904.

[2] Roscoe, J., in *Journal Anthropological Institute*, XXXII (1902), 37.

[3] She weeps although her marriage has been the outcome of a mutual attachment, not, as in other types of Fijian marriages, of betrothal in infancy, or of purely parental determination.

[4] Williams, T. *Fiji and the Fijians*, I, 169. London, 1858.

[5] *La Mare au Diable.*

have for[1] her—ribbons and lace, a fine apron, a hundred pins, a cross of gold.[2] Among the Bashkirs although a girl may have been visited by her betrothed most intimately for a long time when on the final payment on the bride-price he takes her home, she refuses to embrace him until he gives her a piece of money.[3] Sicily, said its poets, was given by Zeus to Persephone on her marriage to Hades.[4] It was her *anacalypteria*, the presents bestowed upon a Greek bride by her bridegroom and his friends when she first unveiled to his eyes. Were not the *anacalypteria* once in the nature of a bribe, even if all Greek brides were not as reluctant as the fair Proserpina? In modern times among the Arabs of Cairo an unveiling present is also made to a bride (and to her attendants). It is called "the price for the uncovering of the face."[5] Among the Beni Amer the postnuptial present, *efin*, has to be repeated after the first child is born as an inducement to congress, the parts of the young mother having been closed again, African fashion, as in maidenhood.[6] . . . Unmistakable bribes, all these, but even more dubious instances, even the *morgen gab* for example, and its many variations I prefer to think of as originally a prospective bribe rather than as compensation money, its orthodox explanation.

When it is not the bride but her people who receive the presents the orthodox explanation or term seems more valid. In their case, between presents as bribes and presents as compensation, the incipient form at least of a bride-price, it may be at times hard to distinguish. And yet if each case is considered in its own setting the distinction in many instances appears justified.—When the Zambales bridegroom and his parents go to the home of the *fiancée*

[1] None of them appears to materialize; but in the church the bridegroom gives the bride *le treizain*, thirteen pieces of silver.

[2] It is this account which is cited by McLennan as evidence for the survival of a rape symbol in France. "Primitive Marriage," App. in *Studies in Ancient History*. But the bride's refrain, sung for her by the matrons, suggests an explanation other than that of the rape symbol for all that follows.

"Mon père est en chagrin, ma mère en grand' tristesse"—a father angry and a mother sorrowing over the disturbance of their family life.

[3] Van Gennep, A. *Les Rites de Passage*, p. 173. Paris, 1909.

[4] *Diodorus Siculus*, Bk. V, Ch. 1.

[5] Burckhardt, J. L. *Arabic Proverbs*, p. 139. London, 1875.

[6] Munziger, W. *Ostafrikanische Studien*, p. 324. Basle, 1883.

to ask for her they are usually told she is "not at home," a way of saying that without a *douceur* she will not be produced.[1] After the *vakamamaca* there follows in the Fijian ceremonial the *vakatrakata* or "warming," food from the bridegroom's party to the bride's.[2] It were tiresome to enumerate all the cases in which such presents occur, presents of food, etc., and occur quite apart from the specific bride-price. I give but two, their bribery character unmistakable. On the morning after a wedding among the Roro-speaking tribes, the bride's father takes up his stand outside the house of the bridegroom's father and, although he has already been paid-up, proceeds to indulge in abuse. He has to be pacified by the present of a dog. Three days later the bride's mother visits her to weep and groan until a pig is killed for her. Then her bewailment gives place to praise of the generosity of her son-in-law and his family.[3] Among the Khyoungtha as the bridegroom's party approaches the bride's village her kinswomen bar the entrance with a bamboo. Across this barrier the bridegroom has to pass around a loving-cup of spirits. He may be barred out in this way five or six times before he is finally allowed in.[4] In the more developed culture of India, among high caste Hindus, it is when the bridegroom wishes to leave the bridal apartments that the kinswomen of the bride get in his way. Not until he hands over to them the *sarjyátoláni*, a sum of from thirty to fifty rupees, will they, particularly his sisters-in-law, loosen their hold on the skirt of his silken garment.[5]

It is, we note, the kinswomen not the kinsmen who are the obstructionists. One of the difficulties in the way of the theory of the rape symbolists, a difficulty they ignore, is the predominant activity of the kinswomen.[6] Why should they be more to the fore,

[1] Reed, pp. 58–9.

[2] Williams, I, 169.

[3] Seligmann, pp. 269–70.

[4] Lewin, p. 127.

[5] Bose, Shib Chunder. *The Hindoos as They Are*, p. 68. Calcutta and London, 1883.

[6] Or of the women among the fellow villagers. Their resistance, according to Crawley, is an expression of sex solidarity. The rape symbol indicates an abduction from the sex, not merely from kindred. (*The Mystic Rose*, p. 370). But how on this hypothesis explain the resistance of the bridegroom's people? How explain the fact, for example, that in the Iglauer peninsula in Mähren the village women, having tied

as they quite commonly are, than the kinsmen? It is a difficulty, the act of ceremonially obstructing, if it is thought of not as a rape symbol but as an expression merely of reluctance, does not present. Kinswomen object to a change in the family even more than kinsmen, and women I can but surmise are more opposed to meeting change in general than men. The row they make on the occasion of a wedding is a kind of ceremonial bluster or ceremonial nagging —when it is not ceremonial grief.

And it may come from the kinswomen of the bridegroom as well. In Northern India his sister or some other near kinswoman refuses to let the home-coming bridal couple enter the house until she receives *largess*.[1] This practice, Crooke suggests, would not be unnatural in a strictly exogamous community where the bride is felt to be an outsider. But the bride who is taken into her husband's family is always somewhat of an outsider and to that family a source of embarrassment.[2]

In his new rôle the son of the family may also be disconcerting and may be called upon to save the situation with presents. On his return home from his wedding the Abchasse bridegroom may not show himself to his parents or senior relatives until he appears formally at the feast given him by the father. The feast is called *aphchaschârche*, "banisher of shame." At it he makes presents to all his senior relatives.[3]

Another ceremonial display of reluctance at marriage is the separation of bride and groom until the close of the ceremonial, sometimes very protracted, and even for some time afterwards. The avoidance practised in the so-called Tobias nights is a taboo not limited to the early Christian Church. In Australia the Mukjarawaint bride sleeps the first night of her marriage on the ground outside her bridegroom's camp.[4] The Euahlayi bride is expected to

a string across the road of the bride who is arriving from a strange village, have to be bought off with a large cake, a bottle of brandy, and a gulden? (Sammter, E. *Geburt, Hochzeit und Tod*, p. 163. Leipzig and Berlin, 1911.)

[1] Crooke, W. "The Lifting of the Bride." *Folk-Lore*, XIII (1902), 232.

[2] How they are wont to cope with it is familiar to the student of *avoidance* customs.

[3] Seidlitz, p. 41.

[4] Howitt, A. W. *The Native Tribes of South-East Australia*, p. 245. London and New York, 1904.

sleep with a fire between herself and her bridegroom.[1] In Queensland, Frazer island, bride and bridegroom live alone for two months in huts about six yards apart.[2] The Roro-speaking bridegroom is just as "shy" after his wedding as before. On his wedding night he goes back to his clubhouse leaving his bride to sleep alone in the house of his father. He is brought back to her the following day, but he does not spend the night. The third day the couple is supposed to be "reconciled," but the bridegroom continues to sleep at the clubhouse for several weeks.[3] Among the Andamanese "it often happens that a young couple will pass several days after their nuptials without exchanging a single word, and to such an extent do they carry their bashfulness that they even avoid looking at each other."[4] That formality may enter into this attitude one may at least surmise. The Tikopia bridal pair sleep together for four nights without consummation.[5] The Kikúyu bride sleeps four nights in the hut the bridegroom has made ready, he staying in his father's house.[6] In Uganda a kinswoman goes with the bride to the groom's dwelling and sleeps there for two nights with the bride.[7] Among the Hupa of Northern California congress is postponed for five nights, that the couple may get used to each other, the old people say.[8] Until a Khyoungtha bridegroom has eaten with the bride seven days, seven times a day, he does not consummate the marriage.[9] . . . There are other instances I might cite of this deferment rite, but instead of what would become

[1] Parker, p. 58.

[2] Smyth, I, 84 ft.

[3] Seligmann, pp. 269–70.

[4] Man, X, p. 138.

[5] Rivers, I, 309–10.

[6] Routledge, W. S. & K. *With a Prehistoric People*, p. 130. London, 1910.

[7] Roscoe, J. *The Baganda*, p. 90. London, 1911.

[8] Goddard, P. E. Personal communication. M. C. Stevenson reports a similar custom among the Zuñi. "The Zuñi Indians," p. 304. (23rd (1901–2) *Ann. Rep. Bur. Amer. Ethn.*) The Zuñi of my acquaintance assert, however, that such is not and never was their practice. The couple sleep together from the beginning, but for the first night or two or perhaps longer the bridegroom comes in late, after the old people are asleep, and he leaves early, before they awake. And for these first days he continues taking his meals with his own family. His shyness is referred to as "staying still."

[9] Lewin, p.130 .

a tiresome enumeration let me conclude by pointing out that even when deferment is not an explicit ceremonial it may be implicitly or indirectly required by the assumption that offspring are not to be born within a year or two of the marriage. Among the Massim no trace of ceremonial deferment has been observed and yet a man at Mukana, a bridegroom of at least two months, volunteered to Dr. Seligmann the information that he had not yet had connection with his wife for if a child were born within a year of marriage people would sneer, saying, "What sort of children are these?"[1] Among the Roro-speaking tribes where deferment, we remember, is customary a woman in former times did not expect to bear a child until her garden was bearing well, *i. e.*, until she had been married one to two years.[2] In the New Britain islands children were not born for a period from two to four years after marriage. "Women did not like to speedily become mothers."[3]

Of the conventionalized expression of reluctance to meet change that occurs in marriage and initiation ceremonial I have given illustrations, some of the facts having been otherwise interpreted; but I need not particularize with illustrations about the unwillingness to meet the change made by death. I have only to refer to various well-known beliefs or practices—the belief that the spirit of the deceased lingers for a period—hours or days or longer—about his home; the set appeals to the dead to return or—to be off; the provision for the wants of the lingering ghost, for both his material and his emotional wants; the preservation of his remains or relics or of his memory or influence; early theories of the life after death, the continuation theory, the theory of reincarnation.

All these ideas or practices appear to express resistances against the Great Change, as the ritualist's descendant, the sentimentalist, calls it; but the ceremonial of the final exorcism is of them all the most pertinent to this discussion, the most analogous with the rites of initiation and marriage. It implies of course a decided reluctance on the part of the ghost to be gone, to start in on his new

[1] Seligmann, p. 745.
[2] *Ib.*, pp. 269–70.
[3] Danks, p. 287.

career, and it asserts that through the rite he can be made to do so —the group controls change in the life of the dead as well as the living. At the *ita* feast of the Koita, six months after the decease, the time when the widow is relieved of her mourning, rubbing off her black paint and putting on a clean petticoat, the brother of the deceased makes a speech to the replete villagers: "We have been eating for and in remembrance of the dead," he says, "now let us worry no more about him since he has ceased from among us." Just as he was once made a man, and then a husband, the deceased is now in the terms of the native "finished."

That it is a relief when the funeral is over is sometimes said among us, but our sense of *finishing* the dead isn't quite as definite as the Melanesian. Nor are our attempts to make a man of a boy or a good husband of a man. Ceremonialism in fact is passing out of our life—perhaps because the desires back of it are dwindling, the desire to shirk change and the desire to control others directly instead of indirectly—at any rate crisis ceremonialism is passing out of modern culture. It will leave fragments of itself behind, however, and the state of mind that prompts it will persist in individuals and will so color points of view and so shape turns of speech as to supply an abundance of enigmas to the rationalists of the future.

NEW YORK CITY

THE QUESTION OF THE ZODIAC IN AMERICA

By HERBERT J. SPINDEN

THE zodiac has long held a place in Old World astronomy but it is doubtful whether any conception remotely resembling it ever existed among American Indians. An opinion to the contrary by Humboldt,[1] one of the first scientists to appreciate the remarkable advances in astronomy made by the ancient Mexicans, obtained wide credence and is often quoted.[2] While none of the early authorities of the first order in either Mexico or Peru makes a definite statement that the zodiac or anything like it was known to the Indians before the arrival of the Spaniards there are not lacking secondary authorities[3] who give some support to this idea. A number of modern champions of the zodiac in America have often expressed their views in scientific journals and it seems proper to state the case of the opposition lest they win by default. In the course of argument these writers have repeatedly assumed identity in meaning (and therefore an unavoidable historical connection) between astronomical and hieratic symbols in Mexico and Central America and zodiacal symbols in the Old World, but have failed conspicuously to meet the broader arguments in force against such assumptions.

In this paper the discussion will proceed as follows. First, will be presented a brief explanation of the Old World zodiac and a summary of the general arguments against the assumption that this concept was transferred to the New World before the time of Columbus. This summary is not designed to settle the question upon *a priori* grounds but simply to record the tremendous weight of evidence against the aforesaid assumption of transference. Second, the particular proofs and arguments made by the champions

[1] 1810, p. 149, et seq.

[2] Clerke, 1911.

[3] For instance, Granados.

of the Old World zodiac in America will be examined upon their own merits, in the light of scientific research in Mexico, Central America, Peru, etc. Third, the possibility of an independent invention in the New World of a concept analogous to the classical zodiac will be discussed. This last phase of the subject will take us out of destructive criticism into a field that is practically undeveloped.

The formal zodiac is a band round the celestial sphere, about 18° in width, with the ecliptic as a medial line. Within this band lie the apparent paths of the sun, moon, and planets. The zodiac is divided into 12 signs, or divisions, of 30° each, covering the passage of the sun from one vernal equinox to the next, and in ancient times these signs were marked by twelve constellations from which they took their names. By reason of precession the constellations of the Greek astronomers no longer mark the signs of the modern zodiac but are 30° to the east of them.

The twelve constellations of the classical zodiac are as follows:

1. Aries, the Ram
2. Taurus, the Bull
3. Gemini, the Twins
4. Cancer, the Crab
5. Leo, the Lion
6. Virgo, the Virgin
7. Libra, the Balance
8. Scorpio, the Scorpion
9. Sagittarius, the Archer
10. Capricornus, the Goat
11. Aquarius, the Waterman
12. Pisces, the Fishes

It is unnecessary to discuss in detail the history and distribution of the various zodiacal conceptions in the Old World. The agricultural and pastoral peoples of western Asia were noted stargazers. Among them the rising of certain constellations in the morning twilight may have been used to indicate the time for important festivals. They observed that the sun, moon, and planets followed a definite path across the sky and they picked out various star groups as markers by which the unequal progress of these luminaries could be measured. While the time periods of the apparent or synodical revolutions of these orbs—taken from one rising or setting with the sun to the next—might likewise be observed, the organization of a zodiac naturally led to the determination of true or sidereal revolutions. The further use of the zodiac in the nefarious art of forecasting events is well known.

The classical zodiac may be called a solar zodiac although in reality its time period is the sideral revolution of the earth. Each sign may originally have served to mark the advance of the sun among the stars from one new moon to the next. But since twelve moons fall several days short of a year a readjustment was necessary and the signs were lengthened slightly till they closed up the circuit of the heavens. The Greeks obtained their zodiac from the Assyrians and after enriching it with mythological instances they passed it on as a heritage to western Europe.

A lunar zodiac of twenty-seven or twenty-eight mansions served to mark the daily progress of the moon among the stars and the period of this zodiac was therefore the sideral revolution of the moon. The lunar zodiac seems to have had its greatest vogue in India. The so-called zodiac of the Chinese may be entirely independent and apart from the zodiacs of western Asia.

We can do little more than conjecture the antiquity of the zodiac in Mesopotamia. It is pretty certain, however, that it rose after the invention of agriculture. We cannot be sure that the earliest notices of constellations of the ecliptic indicate that the concept of the zodiac had already been organized. The sign of Taurus appears to have been the earliest one to begin the cycle which would indicate that the zodiac was formulated about 2500 B.C. In its present sequence, with Aries as the first sign, the zodiac dates from the Greek period. Let us now examine some of the general arguments against the theory that the zodiac was introduced from the Old World into the New before the time of Columbus.

It is generally admitted that America was originally populated from Asia, but on a culture horizon no higher than the neolithic. The simple arts of stone chipping and basket-making were probably brought over by the earliest immigrants but there is abundant evidence that pottery-making, weaving, and agriculture were independently invented long after the original settlement. The cultivated food plants are different from those found in the Old World and there is a vast region in northwestern America and northeastern Asia upon the only obvious line of communication where agriculture and the higher arts have seemingly never been known.

Mr. Stansbury Hagar[1] admits that a knowledge of the zodiac could not have come with the first influx of man into America and that it must have come through accidental or sporadic communication at some later time. He also eliminates the possibility of communication from western Europe and apparently rests his case upon the familiar and romantic device of the venturesome Chinese junk or the ubiquitous Phoenician galley. Granting that vessels in ancient times might have been cast up on the shores of America, what likelihood is there that shipwrecked sailors could introduce such a complicated idea as the zodiac? We know that Scandinavian settlements held their own for several hundred years in Greenland and that journeys were made to Labrador for timber, but we find no trustworthy evidence of influence upon the Northern Indians either in objects or ideas.

There are a small number of anthropologists, such as Graebner, who have assumed an historical explanation for the close similarities in ideas, in social and religious structures, and in material art that are found between otherwise distinct peoples in the New and Old Worlds. The weight of evidence indicates that these similarities should be explained by psychic unity and convergent evolution, rather than by contact and transmission. It is generally admitted that human beings are everywhere so similar in mental structure that they are apt to return the same answer to the same problem. Tools and many other objects of material culture are made in response to insistent and universal needs. Materials while not everywhere the same fall into certain general classes. Mechanical possibilities are often so limited that independent invention of practically the same object is often seen in different parts of the world. Sometimes objects or ideas with diverse original forms modify towards similar resultant forms. Archeological and ethnological science finds it unwise to assume actual connection in the past between peoples who in the present are widely sundered unless there is a bond of language or strong proofs that a considerable number of technological and intellectual concepts have a common origin. In almost all cases where real connection has been proven

[1] 1912*c*, pp. 47–48.

the phenomenon of divergent evolution is important. This is the very opposite of the convergent evolution which to uninitiates furnishes material for phantastic theories.

The history of American civilizations has been blocked out in the rough. The sequence of culture in Mexico and Central America, in particular, has been carefully studied. The most remarkable features were developed from crude beginnings in a manner that is capable of demonstration. Food plants, especially maize, having been domesticated and agriculture put on a firm basis somewhere in Mexico or Central America, new possibilities for human society arose. The pressure of the population upon the food supply was reduced and this doubtless led to a great increase in numbers and to an added effectiveness in coöperation. We have every reason to believe that agriculture passed from this original center over a large part of North and South America and that with it went certain tools and ceremonies which became more or less modified in dispersal. Now agricultural peoples are sedentary and they are more deeply concerned with seasonal changes and astronomical facts than are ranging hunters. There is pretty clear evidence that rough lunar calendars were originally used by the tribes of Mexico and Central America as they are today by the nomadic Indians of North America. But these crude time counts were perfected and the phenomena of the heavens were duly observed and noted after the Indians had acquired permanent habitations and much leisure. It is well known that the Mayan and Nahuan tribes were able to determine with great exactness the length of the year and to calculate the synodical revolutions of the moon, Venus, and other planets. In Peru the knowledge was less extensive but the solstices and equinoxes were carefully measured and Venus was recognized in her double guise as Evening and Morningstar. We must not forget that the most remarkable features of the Central American time counts are absolutely without parallel in any part of the world. They were based not alone upon astronomical facts but also upon a peculiar system of numbers.

Let us now examine the evidences bearing on the zodiac in America presented in several papers by Mr. Hagar. He professes

to find proof that the zodiacal divisions were known to the Pueblo Indians of the Southwest, to the Mayan, Nahuan, and Zapotecan tribes of Mexico and Central America, and to the Peruvians. While he constantly uses the classical zodiac for purposes of comparison he constructs for the nations of Mexico and Central America several variations. First, there is a zodiac of ten parts based on pictures in native books and on random information in Spanish historians of the second crop. Second, there is the normal zodiac of twelve parts reflected in mural decorations and in the arrangement of pyramids at Izamal, Teotihuacan, etc. Third, there is the sequence of the eighteen months of the year, and fourth, the sequence of the twenty days of the month. Both of these are warped into agreement with the normal zodiac.

One half of a ten part zodiac Mr. Hagar finds in the constellations given by Tezozomoc[1] where this historian recites the list of duties read to a newly elected king.

"You must take special care to rise at midnight [and study these stars], Yohualitqu Mamalhuaztli, as they call the Keys of St. Peter among the stars of the sky; Citlatlachtli, the North and Its Wheel; Tianquiztli, the Pleiades, and Colotl Ixayac, the constellation of the Scorpion. These are markers of the four parts of the world according to the heavens. And towards dawn you must observe carefully the constellation Xonecuilli, the Cross of St. Jacob, which appears in the southern sky."

Seler[2] has reproduced plans of all five star groups from the original manuscript of Sahagun who refers to three of them by name in his published texts.[3] Both Seler and Hagar[4] attempt to match the rather conventional plans of Sahagun into star charts. One of the earliest and at the same time the fullest discussion of these stars is that of Paso y Troncoso.[5] Information and opinion may be summed up as follows.

Mamalhuaztli means the Fire Drill (consisting of a vertica and a

[1] 1878, p. 574.

[2] Bull. 28, pp. 355–358; additional information, Seler, 1902–1908, I, pp. 618–623.

[3] 1880, p. 482 and Bustamenti Edition, I, p. 346.

[4] 1910, p. 278.

[5] 1882, pp. 388–398.

horizontal stick) and the supplementary terms Yohualitqui (Tezozomoc) and Yoaltecutli (Sahagun) mean, respectively, Night-bringer and Night-lord. Sahagun makes the definite statement that this constellation is near the Pleiades in Taurus. The published text of Tezozomoc gives the Keys of St. Peter (a star in Aries) as an equivalent Spanish term, but Seler suggests that *nave* (ship) was misread *llave* (key) in manuscript. The Ship of St. Peter is formed by seven stars in Taurus with Aldebaran as the principal one. Paso y Troncoso[1] discusses this constellation fully and after stating various opinions agrees with Molina that it lies in Gemini but his arguments, based upon an identification of this constellation with The Wands (*Los Astillejos*) do not seem sufficient to overrule the statement of Sahagun. Orozco y Berra[2] suggests the Belt of Orion for the three stars associated with the advent of night, while Robelo[3] agrees with the majority in placing the constellation Mamalhuaztli in Taurus. Hagar[4] is forced to choose Cancer by the exigencies of his thesis and is able to find a star grouping that agrees fairly well with the plan of Sahagun but that has nothing else to be said in its favor.

Citlatlachtli means the Star Ball Ground although explained by Tezozomoc as the North-and-Its-Wheel. It is constructed by Seler out of circumpolar stars.

Tianquiztli, the Market, is definitely stated by Tezozomoc to be the Pleiades. It was also called Miec, the Heap. This constellation is said to have assumed special importance among the Aztecs in connection with a new-fire ceremony at the beginning of a 52-year cycle. Sahagun's plan agrees with this group (although supernumerary stars are shown as in other cases) and it is quite unnecessary for us to accept the suggestion that the inconspicuous stars of Virgo are represented.

Colotl, the Scorpion, or Colotl Ixayac, the Scorpion Face, is the Aztec name for a constellation possibly identical with Zinaan Ek, the Scorpion Stars of the Maya. Assuming that this constellation marked the cardinal point west for the Mexicans, Seler argues that

[1] 1882, pp. 390, 396–397.
[2] 1880, I, p. 32.
[3] 1905, pp. 238–239.
[4] 1910, p. 286.

it could hardly have been the classical Scorpio which lies far south of the Equator. He then offers the suggestion that stars in Boötes made up this group and that Arcturus instead of Antares was the "heart of the scorpion." If the scorpion star groups of the New and Old World are really the same we have indeed a remarkable coincidence. Still the constellation is a very brilliant one, the curved tail is a conspicuous feature and the Aztec word for scorpion means curved. As far as the statement of Tezozomoc goes, Seler has no support in his assumption that the star group marked west rather than south. In fact he deliberately includes a fifth constellation, not named as a direction marker, for south and then takes the Pleiades from the west to mark the center or zenith. A modern star map of the Huichol[1] represents the Scorpion with the claws opening towards the west but it stretches across the sky and can hardly be said to mark this cardinal point. Indeed, Seler[2] seems to defeat his own arguments by interpreting a symbol at Chichen Itza as referring to the conjunction of the planet Venus with a star group in the form of a scorpion. Such a group must lie close to the ecliptic and there is a possibility that it might be the classical constellation of Scorpio.[3] This matter will be taken up again. Mrs. Nuttall[4] identifies Colotl with Ursa Major.

Xonecuilli has been variously identified as the Southern Cross and Ursa Minor. The name means Twisted Foot and refers to its s-like shape. The constellation may have been connected with the god Mixcoatl.

Taking the Aztec star groups, already described, in the order given by Tezozomoc in the passage quoted above Mr. Hagar identifies them with the following classical signs:

1. Mamalhuaztli	Cancer
2. Citlatlachli	Leo
3. Tianquiztli	Virgo
4. Colotl Ixayac	Scorpio and Libra
5. Xonecuilli	Sagittarius

[1] Lumholtz, 1900, p. 57.
[2] Seler, 1910, pp. 162–165.
[3] Paso y Troncoso, 1882, p. 388.
[4] Nuttall, 1901, pp. 8–9.

It is apparent that he has seized upon Scorpio (represented by name in both lists) as a point of departure and has counted forward and backward from this constellation along the classical zodiac. The statement made by Tezozomoc himself that the first four of these star groups marked the four directions is a pretty sure indication that they did not form a continuous series along the ecliptic. Besides, we have the word of Sahagun that Mamalhuaztli is in Taurus, rather than in Cancer, and we know that Tianquiztli (the Pleiades) is in the same sign.

Only the second half of the zodiac of ten parts, made possible by joining Scorpio with Libra and Aries with Taurus, is seen by Hagar in the star groups given above. He finds, however, a complete zodiac of this type pictured forth in pages 46–50 of the Dresden Codex. On each page are three pictures. The upper picture represents a god seated on a celestial throne and holding a bowl. The middle picture shows a divinity with spears in one hand and a spear thrower in the other. The bottom picture shows an individual into which a spear has been thrust. In one case this is a jaguar, in another it is God E, and in a third it is God K. Interpretation of these pictures is difficult but Hagar sees in the two lower figures on each page a dominant zodiacal sign and its conquered opposite.

Although the pictures are ambiguous the calculations are unmistakable. Each of these five pages deals with 584 days and together they deal with five times 584 or 2920 days and with thirteen times 2920 or 37960 days. This number 2920 equals eight solar years as well as five synodical revolutions of Venus. Now if the pictures represented a zodiac we should expect to find the sideral revolutions of Venus dealt with rather than the synodical. Although this number of days almost exactly equals thirteen sideral revolutions of the planet there is not the slightest evidence that the authors of the codex were aware of the fact. According to Seler, the pictures already referred to have very close analogues in a number of Mexican manuscripts including the Codex Borgia, the Codex Vaticanus B, and the Codex Bologna. They represent the fatal influences of Venus for each one of its five revolutions. In the *Anales de Quauhtitlan* the influences are recorded as follows:

1. In the sign Cipactli it shoots the old men and women.
2. In the sign Coatl it shoots the rain; it will not rain.
3. In the sign Atl there is universal drought.
4. In the sign Acatl it shoots the kings.
5. In the sign Olin, it shoots the youths and maidens.

These five signs are the names of the days with which the 584-day periods begin. In the Dresden Codex they are Cib, Ahau, Kan, Lamat, and Eb. The numbers associated with each sign may vary from 1 to 13 through the entire Venus calendar round of 65 revolutions or 104 years.

The correlation between the zodiacal constellations and the day and month names current among the Mexican and Central American tribes, which Hagar has presented in a number of papers, is a monument to ingenuity. It is well known that the series of named days agrees in meaning in the different languages of this area while the tonalamatl (or permutation cycle of twenty names and thirteen numbers) everywhere begins with equivalent days. (Imix for the Maya, Cipactli for the Nahua, Chijilla for the Zapotec, etc.) But as regards the months there is no such agreement. The names in the different languages are entirely unrelated in meaning and while there may be a common point of departure in time this has not yet been determined.

On the Aztec Calendar Stone the twenty days are represented on one of the outer bands that decorate the disk of the sun. But this circumstance alone gives little support to Mr. Hagar's statement that the circle also represents a zodiac. He assumes that the four great rays represent the solstice and equinoxes and even ventures to point out which one marks the vernal equinox. Here he makes his beginning with the day Acatl and distributes unequally the twenty days to the twelve signs in sequence, with one, two, or three days falling to each sign. Since the concordance of Mexican and Maya days is perfectly known he has no difficulty in extending his correlation to the Maya calendar.

The Mexican days are mostly named from everyday animals and objects. It is possible that some of these names were also given to special stars or to constellations although Mr. Hagar has furnished

no real evidence on this question. In the Bodleian Manuscript, which seems to deal largely with astronomy, there are a number of figures of great stars with identifying glyphs attached. A Flower Star is drawn several times and an Eagle Star is also given. In one picture is shown an Ocelotl head with three star symbols (round eyes) attached: this may represent a constellation. These star signs are mostly used as the names of persons, but possibly we may be justified in supposing that they represent named stars since the observation of stars through notches and forked sticks is pretty clearly shown in this codex. However, simply because three names of Mexican days are also given to stars we must not jump to the conclusion that the other seventeen names exhibit a similar usage. The Cloud or Smoke Star, the Butterfly Star, etc., in the same manuscript do not belong to the day name series.

Another writer, Mr. Hermann Beyer, constructs a zodiac for the Mexicans, namely one of thirteen parts, in which the days are distributed in a fundamentally different fashion. He argues that the two "plumed serpents" that surround the disk of the sun on the Calendar Stone represent the ecliptic. These monsters have been named Xuihcoatl and it seems likely that they are related to the Two-headed Dragon of the Maya (which does not always have two heads). It is true that this earlier concept often bears symbols of astronomical import from its elongated body but these symbols do not occur in a definite sequence as they would have to do if a zodiac were represented. Out of the stars of Taurus Mr. Beyer constructs the head of Xuihcoatl. He then identifies this head with Cipactli, the first of the Mexican day series. Now it is pretty certain that Cipactli and its Maya equivalent Imix do refer to some monster but that they refer to Xuihcoatl is pure guesswork. Given a starting point, Mr. Beyer names the thirteen zodiacal divisions as follows:—

1. Cipactli, 2. Ocelotl, 3. Mazatl, 4. Xochitl, 5. Acatl, 6. Mizquintli, 7. Quauhuitl, 8. Malinalli, 9. Coatl, 10. Tecpatl, 11. Cuetzpalin, 12. Ollin, 13. Itzcuintli.

These days are the beginning days of the first fourteen divisions

of the formal tonalamatl except that often the tenth sign (Tecpatl) the day Ozomatli is taken out to represent the polar sky. The series of days given above covers in the tonalamatl a period of fourteen times thirteen or 182 days—or one half of a 364-day year. As we shall see presently the so-called ritualistic year of 364 days is divided a number of ways, among others into thirteen times twenty-eight and twenty-eight times thirteen. Whatever might be said in favor of these divisions being reflected in astronomical symbolism cannot be construed as an argument that thirteen divisions of the ecliptic were named in accordance with the list of days given above. If the list covers, let us say, the first half of a year it will not occupy the same position again for thirteen years and in the meantime will continually occupy a variety of other positions separated by intervals of seventy-eight days (the rest of the tonalamatl after 182 days have been counted out). Such a series of names would be completely out of harmony with star groups along the ecliptic which make their revolution in a sideral year.

In the curious book called *Tardes Americanos*[1] published in 1778, and written in the form of a dialogue between an Indian and a Spaniard, there is what purports to be a native zodiac. On analysis, however, it turns out to be a distorted tonalamatl. There are said to be twenty signs for the sun's annual course, for each sign thirteen houses and for each house seven characters. The twenty signs are the twenty days of the month in their usual order. The thirteen houses are the first thirteen days of the month and the seven characters are the remaining seven days of the month. Of course, no such arrangement can be made to cover a year.

Humboldt, on the rather slender basis of the evidence available in his day, contributed to the misconception of a Mexican zodiac in which day names played a part. His method of procedure was different from any of those just explained. He simply pointed out that a number of Mexican day names had the same, or approximately the same, meanings as zodiacal names from Tibet,[2] India, and other parts of the Old World. But Humboldt did not pretend

[1] Granados, 1778, pp. 63–67.

[2] Op. cit., p. 157 et seq.

that these similar names were found in the same order, nor did he prove that they were given to a zodiac in Mexico although inferring that they were. Several writers, then, have attempted to use Mexican day signs in the construction of a zodiac, but the entire lack of agreement among them is a strong argument against any one of them being right.

The eighteen months of the year are distributed by Hagar over the twelve signs of the zodiac in a fashion that is somewhat irregular. A naïve effort seems to have been made to find the Aztec and the Maya month in which the vernal equinox fell during the first half of the sixteenth century and to use this as a point of departure by identifying it with Aries. At this time the constellation of Aries was already warped about 25° out of its theoretical position by the precession of the equinoxes. Unfortunately Mr. Hagar does not seem to have grasped the exact character of Mexican and Central American time counts because his correlation is considerably awry. Let us examine the table of correspondences for the first three signs.

Sign of classical zodiac	Aztec month	Maya month
Aries	Atlacaualco	
	Tlacaxipeualiztli	Mac
Taurus	Tozoztontli	Kankin
	Ueitocoztli	Muan
Gemini	Toxcatl	Pax

Atlacaualco is given by several writers as the first month of the Mexican year and its beginning is ordinarily placed in February. But accounts differ pretty widely both as regards Atlacaualco being the first month and the day on which it began. If we accept the statement that the year bearer was the initial day of the year (and their seems to be little doubt on this point) it follows from the few exact dates that have come down to us that Toxcatl was the first month.[1] At any rate we have reason to believe that Atlacaualco fell on the 6th of February, Old Style, in 1521, or on February 16th of our present calendar. It can be clearly demonstrated that the leap year error was not interpolated in Mexican or Central American year counts, although calculated very accurately, and that

[1] Compare Seler in Bull. 28, pp. 135–143.

the months thus fell behind the seasons at the rate of about twenty-four days to a century. The differences among the various authorities on the beginning days of Mexican months is largely to be explained by this retrogression as well as by the changes instituted in the European calendar by Pope Gregory in 1582.

Tlacaxipeualiztli, the second Mexican month according to some authorities and the first according to others, began in 1521 on March 8th of our present calendar. It took its name from Xipe, the Lord of the Flayed. The cult of this divinity spread from Central Mexico to Salvador and among the Quiché and the Cakchiquel; one of the months was named after this god. In a Cakchiquel calendar dated 1681 the month Tacaxepual is given as the first month of the year and its beginning is placed on January 31st. Counting forward the number of days lost through the failure to correct the leap year error brings us within a day or two of the beginning day of Tlacaxipeualiztli in Mexico in 1521. In the commentary that accompanies this calendar is the statement:

"Because since neither the Mexicans nor these [the Guatemalans] understood leap year day . . . they drew apart and became different from our calendar, and as neither these nor the Mexicans always commenced their year on the first of our February but each four years they lost a day: that is the year 1681, that of '82, that of '83 and that of '84 commences the year of the Indians of this kingdom on the first of February and that of 1685 will commence on the 31st of January and that of 1805 will commence of the first of January and four years thence on the 31st of December, etc."

We have here a clear explanation of the retrogression of the Mexican and Central American calendar. It has long been recognized that interpolated corrections would vitiate the elaborate calculations of the Maya where solar, lunar, and Venus periods are correlated over vast stretches of time. The significance of this indisputable fact in relation to the theory of the zodiac is this. The months could not possibly maintain a close time relation to the signs of the zodiac as Mr. Hagar assumes they did maintain. Even if we should admit that Atlacaualco and Tlacaxipeualiztli coincided with the vernal equinox or with the constellation of Aries during the

first years of the Spanish conquest this correlation would not hold for the future and what is more important could not have been true in the past. These two months in 1521 embraced the period between February 16 and March 27 N.S. and barely included the vernal equinox. The sun, however, did not actually enter the constellation of Aries until April was well under way.

Corresponding to these two months he selects only the month Mac from the Maya calendar. Now if we add to the date given by Landa the necessary 10 days to bring it into New Style (Landa died in 1579 and his *Relacion* was written before 1566) we find that the month Mac extended from March 13 to April 1, N.S. To bring this date into conformity with the year 1521 we should put these limits ahead some eight or ten days, thus making up for the loss through leap year interpolations in the European calendar between 1521 and the year when Landa wrote his book.[1] The single Maya month which is given as the zodiacal equivalent of two Mexican months falls entirely out of the range of these two months. Now it is perfectly clear that Mr. Hagar believed he was safe in taking Mac as the month in which the vernal equinox fell. Förstemann had written a number of papers on the supposed positions of the solstices and equinoxes in the Maya months. In these papers there s no doubt that the eminent Americanist proceeded from a false assumption to a false conclusion. This unlooked for failure of the months to occupy fixed positions in the year furnishes an acid test for all the petty details and circumstances which Mr. Hagar has advanced as supplementary proof of his theory.

The figure of the Scorpion, whenever found, serves Mr. Hagar as an infallible indicator of the zodiacal sign of Scorpio. A recent paper by him is devoted principally to this sign in relation to the Maya month Tzec and the day Manik. Arguing from the correlation of the Maya months with the European calendar as given by Landa he is able to make the month Tzec correspond in time with the entrance of the sun into the sign of Scorpio. The month name Tzec is given the meaning scorpion on very doubtful grounds. It is represented

[1] If 1541 had the year bearer 13 Kan as Nakum Pech states then the sample year of Landa with the year bearer 13 Kan must have been 1553. The correlation for 1521 would necessitate the addition of eight days.

by a uniform hieroglyph on the monuments and in the codices over a long period. Moreover the retrogression of the months at the rate of about twenty-four days in a century would soon warp it out of all time relation with its original position in the year.

The glyph Manik is also practically identical in ancient and modern forms, and everywhere represents a partially closed hand. It seems to be phonetically connected with the Maya word "to grasp." The day signs in the Books of Chilan Balam are practically worthless since in only a few instances do they agree with the forms preserved by Landa, while these in almost all cases can be definitely connected with the glyphs in the ancient inscriptions. Mr. Hagar finds two anomalous glyphs called Manik in these late manuscripts and sees in them a picture of the "conventionalized tail and sting of the scorpion." These glyphs are figured by Mr. Hagar[1] and the writer for one fails to find grounds for such identification.

On pages 38 to 49 of the Tro Cortesianus codex are a series of pictures and tonalamatls dealing with the chase. In the last half of this section are eighteen pictures of game caught in snares and traps. In sixteen cases the game is a snared deer, in one case it is an armadillo caught in a deadfall trap and in one case it is a snared peccary. The rope which makes the snare is fastened in fourteen instances to a tree or post and in three instances to the tail of a figure that doubtless represents the scorpion. The exact significance of this picture is unknown but the series as a whole has to do with hunter's luck and the black God M who seems to be a god of hunting often has a scorpion's tail attached to his belt as a symbol. The scorpion's tail in these pictures ends in a hand. Mr. Hagar identifies these pictures with the zodiacal sign of Scorpio and the month Tzec and the hand with Manik. The snared deer is the opposite sign of the zodiac. Surely such an identification must be called the wildest of guesses.

As concerns the grouping of mounds at Izamal and San Juan Teotihuacan in accordance with the zodiac the opinion of Mr. Hagar in neither case is based upon a study of the archeological remains. For Teotihuacan he depends upon two maps, probably apocryphal,

[1] 1915, p. 489.

both of which come far from giving a faithful plan of the city. As for Izamal the curious account of Lizana does not justify the conclusions drawn from it nor does the rough survey of the remains of this site made after the theory was formulated compare with the hypothetical plan. It would take us too far to criticize in detail Mr. Hagar's paper on Acanceh but his general conclusions have the same inherent errors hitherto observed.

Mr. Hagar also writes on the zodiac among the Peruvians. He sees twelve signs pictured forth in a crude seventeenth century manuscript. Most of the pictures, accompanied by notes in Spanish, Quechua, and Aymara, undoubtedly relate to the heavens. The sun, moon, morning star, evening star, rainbow, etc., are clear enough. Some of the remaining figures may relate to constellations but internal evidence that they relate to a series of zodiacal constellations is conspicuously absent. Mr. Hagar identifies four of the signs after round-about arguments, and then practically assumes that eight others fill out the zodiac. Let us examine the proof of the four in question.

1. The inscription in Quechua reads "Puma lance." Support for identifying it with the sign of Leo is found in priestly writings but all we know for a certainty is that somewhere in the heavens there was a Puma star.

2. The cloud-like figure bears the inscription "Winter cloud" in Spanish and "harvest" in Quechua. Mr. Hagar identifies this with the Pleiades and by extension with Taurus. He admits that the Pleiades was called "the granary" by the Peruvians, but thinks the crude sketch is doubly symbolic of a cloud and an ear of corn!

3. The larger enclosure bears the label "Mother ocean" in Quechua while the smaller one is named "spring." Then there is another word which is translated "umbillicus." And after this the road is clear through Assyrian symbolism to the sign of Aquarius.

4. The sketch bears the Spanish inscription "tree" and an Aymara word which also means tree. But this second word has other meanings such as "king," "mummy" and "immortal." The constellation of Scorpio, associated with festivals of the dead the world over, is here pictured forth as a tree although it would be possible to construct a mummy out of some of its stars!

Where the clearest proofs are as tenuous as in this instance, the admittedly speculative parts are quite beyond discussion. Needless to say other zodiacs constructed for Peru vary from this as far as fancy can range.[1]

How anyone writing on Peruvian astronomy can deliberately ignore Garcilasso de la Vega, who with all his faults, must be considered our best authority on the civilization of the Inca, is inexplicable. By this writer the range of Peruvian astronomical knowledge is thus summed up: "They knew not what caused the increase and wane of the moon, nor the movements of the planets; nor did they take account of more than three planets, and those owing to their size, splendour and beauty. They did not know of the other four planets. They had no ideas of the signs of the zodiac, much less of their influences. They called the sun Yuti, the moon Quilla and the planet Venus Chasca, which means curly from its numerous bright rays. They also observed the seven little goats (Pleiades) from being so close together, and from the difference they saw between them and the other stars, which excited their wonder. They did not watch the other stars, because having no necessity for so doing they knew of no object to be gained by examining them nor had they more special names for the stars than the two already given."[2]

Of course it was not strictly true that the Peruvians had names for none of the remaining stars. But the list is not very long and zodiacal constellations are not conspicuously represented.[3]

In all his papers Mr. Hagar has not presented a single sound and convincing argument, in the opinion of the present writer, that the classical zodiac was introduced from the Old World into America. That a considerable interest was aroused in the zodiac after the Conquest there can be little doubt. A large part of the Book of Chilan Balam of Kaua is an almanac set over rather clumsily into Maya. The Ptolemaic conception of the universe is presented in diagram with the eleven heavens bearing their Latin names. The year of fixed and movable feasts is given in full as well as a

[1] Lopez, 1868, pp. 322–343; Krum-Heller, 1912, etc.

[2] 1869–71, pp. 175–176.

[3] See, for instance, Acosta, 1590, pp. 209–210.

zodiac with pictures of the various signs. The translations of the European names are naïve. Thus Gemini is *catul polal*, "two sons"; Pisces is *cacot cay*, "two fish"; Taurus is *vacax lae*, "a cow it is"—the word *vacax* coming from the Spanish *vaca*. Surely if the Maya had known a zodiac with comparable divisions they would have disclosed the fact in this manuscript.

Zodiacs have been imagined for other American Indian tribes. L'Heureaux[1] claims that the Blackfoot have such a belt of constellations, apparently derived from the Aztecs. A recent German writer[2] establishes the record for absurdity by constructing zodiacs out of the clan names of the Zuñi, Sia, Iroquois, etc.

There is, however, an entirely different problem connected with the zodiac touched on hardly at all by the writers mentioned above. Since the ecliptic is real and permanent and since the stars that lie close to it can be used to mark the progress of the planets without being grouped as in the Old World it is not impossible that a conception akin to the zodiac should have arisen independently in the New World and especially in the region where careful observations of the planets are known to have been made. We know that the sideral revolutions of the heavenly bodies were well known to the Assyrians and that this knowledge is directly traceable to the formalization of the zodiac concept. Dependable proof of the existence of any sort of zodiac in the New World is to be found not in the far-fetched interpretation of symbolic acts and designs which stand service to the preconceived notions of this or that writer, but in calculations that reflect a knowledge of sideral time periods and in picture series combined with such calculations.

The natural cycle of the zodiac is the sideral year. The difference of only twenty minutes between the tropical and sideral year —mostly accounted for by the precession of the equinoxes—would probably not be observed by nations on a moderate plane of culture. But in the long run this slight difference of a day in seventy years would make itself felt.

There is considerable evidence that the rising of prominent stars

[1] 1868.

[2] Bork, 1913, pp. 41–46.

and constellations in the morning or evening twilight was duly noted by certain American Indian tribes and that the civil or ceremonial calendar was regulated to some extent by those occurrences. Most tribes were doubtless as well aware of the annual changes in the heavens as they were of the diurnal ones. Star lore among the Hopi, the Pawnee, etc., seems to have gone much farther than is generally supposed, possibly through dissemination of the astronomical knowledge of the Mexicans.

While in the case of the earth itself the difference between the sideral or true revolution and the tropical or seasonal one is so slight as to be almost negligible this is not the case with the sideral and synodical revolutions in general. The synodical or apparent revolution of a planet is really not a revolution at all, it is simply the time necessary for the earth to gain or lose a lap in an unequal race round the sun. In the case of the moon the difference is likewise considerable although explainable upon other grounds.

Planet	*Sideral Revolution*	*Synodical Revolution*
Earth	365.26 days	365.24
Moon	27.32	29.53
Mercury	87.97	115.88
Venus	224.70	583.92
Mars	686.95	779.94
Jupiter	4332.58	398.87
Saturn	10759.22	377.75

The sideral revolution of the moon takes between twenty-seven and twenty-eight days. The European week of seven days came from the east and it has been explained as a quarter of the lunar period as measured by the lunar zodiac. A period of twenty-eight days divided into four weeks of seven days seems to have been known to Central American nations. If such a twenty-eight day month is taken thirteen times we have a 364-day year. In the Dresden and Peresianus codices are calculations dealing with such a year (called by Förstemann the Ritualistic Year) and several vague references to it are found in early writings. Padre Marquez says of the Mexicans: "They divided, in the second place, their year into 28 other periods of 13 days each, or 364 days, leaving one to the end which was considered the most unlucky of the five

nemontemi." But in reality thirteen sideral lunar months equal only 355.16 days. This sum falls more than ten days short of the true year. It is difficult to see how so poor an approximation as this can offer proof that the progress of the moon among the stars was duly noted. It is much more likely that the 364-day year was chosen for mathematical reasons: this number contains a different set of factors than does 365.

The ritualistic year was divided in a number of ways. First the important tonalamatl period (260 days) is supposed to have been taken out leaving a remainder of 104 days. According to one hypothesis the principal tonalamatl was the one occupying the middle position in this year with 52 days before and after, one quarter of the ritualistic year or 91 days was assigned to each of the Bacab gods who controlled the four directions. The ritualistic year was also divided into thirteen times twenty-eight days, twenty-eight times thirteen days and fifty-two times seven days.

On page 32a of the Dresden Codex is a condensed time count taking the following form:

13	13	13	13
Manik	Cib	Chicchan	Ix
Chuen	Ahau	Muluc	Eznab
Men	Kan	Ben	Ik
Cauac	Lamat	Caban	Cimi
Akbal	Eb	Imix	Oc

Each row of day signs bears the number 13 and if we begin with 13 Ix in the upper right-hand corner and proceed towards the left to 13 Chicchan we find that 91 days have elapsed. The same interval exists between 13 Chicchan and 13 Cib, 13 Cib and 13 Manik; 13 Manik, and 13 Eznab, etc. In other words each horizontal row accounts for four times 91 or 364 days and the five rows account for five times 364 or 1820 days. This equals seven times 260 days and as a result forms a continuous wheel: that is, the last date, 13 Akbal, is exactly 91 days from the first day 13 Ix. Curiously enough the presentations of the Ritualistic Year in the codices have in most cases to be read backwards.

Förstemann attempted to analyze the long numbers that accompany this block of glyphs but was successful only in showing a remarkable series of common multiples. It is evident, however, that the 364-day year was carried along in calculations over great stretches of time. In the inscriptions the numbers 5–1–0 (five times 364) occurs frequently.

FIG. 1. Plate XXIII, Codex Peresianus.

The most important passage in the codices for its possible bearing on a zodiac will now be treated in some detail. On the last two pages of the Peresianus Codex (Plates 23 and 24 of De Rosny's reproduction) are two rows of animal figures in connection with celestial shields and sun symbols. In the upper row the celestial shields are suspended from a constellation band that passes across both pages. In spite of a partial scaling away of the painted surface we may be sure that the constellation band turned downward at the

left and although it might have been cut off short at the right end, there is little doubt that the constellation band formed the elongated body of a Two-headed Dragon. This subject may have been represented with both heads as on Plate 22 of this manuscript or with only the front head as on Plate 76 of the Dresden Codex. The calculations on these two pages can be made complete, as we shall

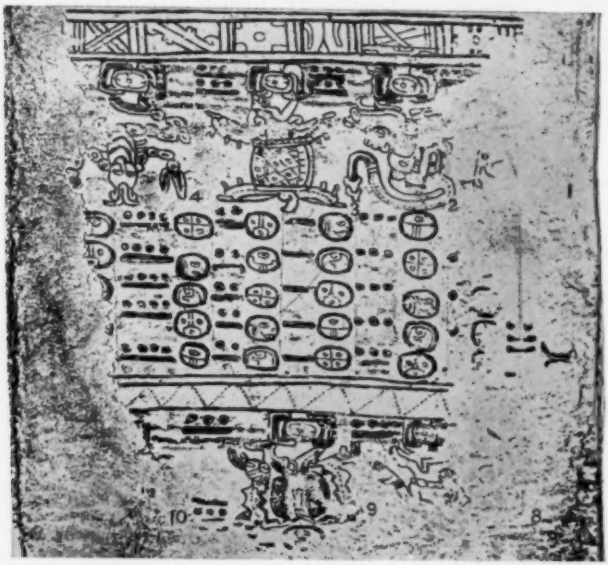

FIG. 2. Plate XXIV, Codex Peresianus.

see, and there is little likelihood that the design was continued on succeeding pages now lost. There are seven animal pictures in the upper row, three on Plate 23, and four on Plate 24. The figure on the extreme right is almost destroyed. The celestial shields of the lower row are attached to a horizontal strip with no other markings than a zigzag dotted line. The figures here are much destroyed but it seems likely that three were originally drawn on each page. Counting the two rows we should thus have thirteen animal figures, each one connected with a symbol of the sun (Figs. 1–2).

Between the two picture series just described are columns of day signs with numbers. They are arranged systematically in columns and rows. The series becomes continuous as Seler and Förstemann have shown, only if we count horizontally from right to left. We then find that each of the five rows has thirteen numbers. The numbers increase by two toward the left. Only five days are represented, namely, Lamat, Cib, Kan, Eb, and Ahau and in the five rows the permutation of these days with the thirteen numbers is exhausted. If we begin with 12 Lamat in the upper right-hand corner and proceed horizontally across the two pages we find a continuous difference of twenty-eight days between adjacent members.

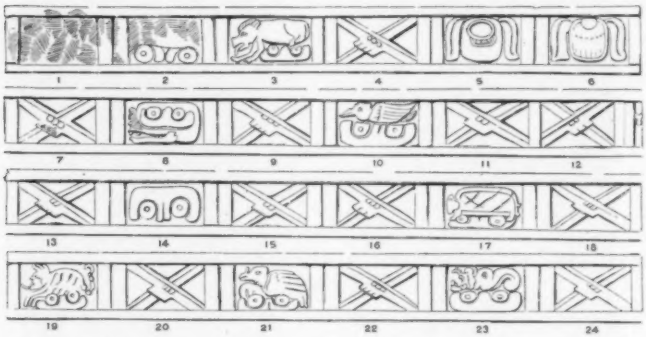

FIG. 3. Star symbols over the doorway in the east wing of the Casa de Monjas, Chichen Itza.

Thus 1 Cib is twenty-eight days in advance of 12 Lamat while 3 Kan is another twenty-eight days in advance of 1 Cib. Each row then represents thirteen times twenty-eight or 364 days and the five rows equal five times 364 days or 1820 days. This sum as we have already seen is equal to seven times 260 days and as a result the first day sign of the sixth row—if one should be added—would again be 12 Lamat. There are other numbers appearing on these pages which serve some unknown purpose. Thus between each celestial shield there are one or two 8's, and at various points above and below the day sign series there are numerals in blue which may be corrections.

The essential point is that we have here five of the so-called Ritualistic Years, consisting of 364 days and divided into thirteen periods of twenty-eight days each. Now the twenty-eight day period is closer to the sideral than to the synodical revolution of the moon and it is conceivable that it might have served as the basis for a zodiac. The thirteen animals holding in their mouths the sign of the sun might therefore represent thirteen signs of a zodiac. The pictures are probably to be taken in the same order as the calculations or from right to left. They are as follows:

Upper Line	*Lower Line*
1 destroyed	8 frog?
2 rattlesnake	9 deer?
3 tortoise	10 destroyed
4 scorpion	11 destroyed
5 king vulture	12 death
6 marine monster	13 peccary
7 bird	

On the eastern façade of the Monjas at Chichen Itza is a long band of star symbols of exceptional interest (Fig. 3). Out of the twenty-four symbols reproduced in Maudslay's drawings no less than twelve are the diagonal cross which from its frequent occurrence elsewhere must be explained as a symbol of broad meaning. Most of the others show the well known Venus hieroglyph in combination with some animal or bird. Seler has suggested that these combinations refer to the conjunction of Venus with various star groups. Since Venus is seen only among the stars of the ecliptic it follows that these star groups may belong to a zodiac. Accepting Maudslay's drawing as complete the order of the symbols is as follows, reading from left to right:

1. Diagonal Cross? (erased)
2. *Venus (doubled form?)*
3. *Venus and Peccary*
4. Diagonal Cross
5. Moon in sky shield
6. Imix in sky shield
7. Diagonal Cross
8. *Venus and Death's head*
9. Diagonal Cross
10. *Venus and Bird*
11. Diagonal Cross
12. Diagonal Cross

13. Diagonal Cross
14. *Venus*
15. Diagonal Cross
16. Diagonal Cross
17. *Venus and Tortoise*
18. Diagonal Cross
19. *Venus and Scorpion*
20. Diagonal Cross
21. *Venus and Vulture*
22. Diagonal Cross
23. *Venus and Reptile*
24. Diagonal Cross

Now the series given in the Peresianus Codex in connection with the 364-day year may refer, as we have seen, to the continuous conjunctions of the sun with a series of star groups. It is gratifying to find that this series devoted to conjunctions of Venus shows a number of similar figures or symbols. Signs 17, 19, 21, and 23 of the Monjas series seem to be identical with signs 3 to 6 of the Peresianus series and to occur moreover in the same order. Other similar signs include the peccary, the death's head and a bird of uncertain genus (3, 8, and 10 of the Monjas series and 7, 12, and 13 of the Peresianus series). Certain stars in Gemini were called the Tortoise stars according to the Motul dictionary. In the opinion of the writer these two series of pictures furnish the best evidence so far presented that a sort of zodiac had been developed by the Indians of Central America. However, even this falls far short of absolute proof. It must be remembered that no certain calculations referring to sideral time have yet been discovered in Mexico and Central America. The ritualistic year may have been chosen for the convenient factors of the number 364. It seems especially significant that while the Indians had observed that five synodical revolutions of Venus of 584 days require exactly as many days as eight solar years at 365 days, they do not seem to have discovered the additional fact that thirteen sideral revolutions of Venus are completed at practically the same time. Förstemann has suggested that the sideral revolution of Saturn may be recorded in one place but he is probably in error. As for Mercury, Mars, and Jupiter, it is possible that future studies will disclose a knowledge that at present is much in doubt. Observation of the many celestial bands on the ancient Maya monuments has failed to reveal any series of star symbols comparable to the two just presented. On the showing then of these two examples we may be justified in holding open the

question of the zodiac in America so far as the possibility of an independent invention in Central America is concerned. But surely the age-long fallacy of pre-Columbian introduction from Europe should be dismissed.

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NOTES ON EXPLORATIONS OF MARTHA'S VINEYARD

By S. J. GUERNSEY

UNDER the direction of Professor F. W. Putnam I undertook for the Peabody Museum of Harvard University a preliminary archeological survey of the Island of Martha's Vineyard in the month of August, 1912 and 1913. The extent of the field was that portion of the island and of Gay Head within easy walking distance of Menemsha creek (fig. 4); this included the town

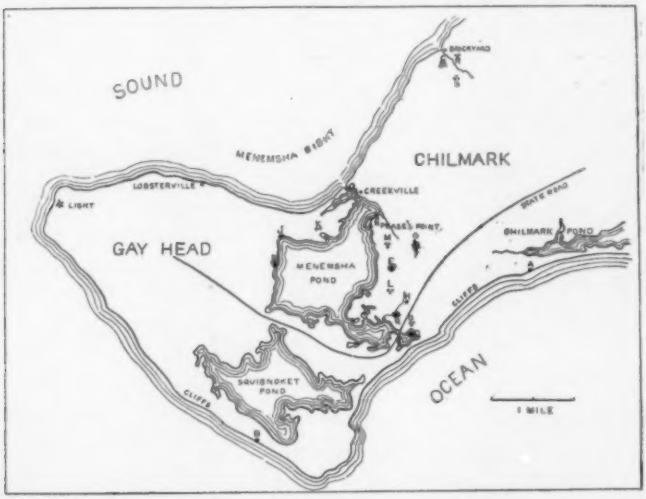


FIG. 4.—Map of western end of Martha's Vineyard.

of Chilmark and the greater part of Gay Head. The cliffs on the south side of the island from Chilmark pond to within one mile of Gay Head light and the shores on the sound side from "Lobsterville" to the "Brickyard" were examined. One day was spent in visiting Watcha and Oyster ponds in West Tisbury, where inter-

esting features were noted which are referred to later. I was unable to explore two promising sites, owing either to the condition of crops, or to the reluctance on the part of owners to grant permission. Results from the work indicate that further investigation might be undertaken with profit as the unworked sites show more surface indications than those examined.

Historic

The first visit to Martha's Vineyard by Europeans of which we have any record, was that of Gosnold in 1602. According to Archer's account his vessel anchored for the night of May twenty-fourth of that year in what is now Menemsha bight.

The island remained in sole possession of the Indians until some time after 1623 when several English families settled on the eastern end. The elder Mayhew having received a grant of the island in 1642 established his colony at what is today Edgartown. At this time, the Indians were estimated to number 3000. After the arrival of the whites, epidemics at various times reduced the Indians to 1500 souls in 1674. The western portion of the island was the last to be taken over by the whites, Gay Head remaining to the present day in possession of the descendants of the aboriginal owners. As late as 1817 some of the Indians on Gay Head lived in wigwams, and three of the five families remaining in Chilmark occupied these primitive habitations.[1]

House and Village Sites

On the south shore the only discovery worth noting, was a pit (fig. 5) disclosed by the breaking away of a portion of the cliff at a point nearly opposite the west end of Chilmark pond, which is here separated from the ocean by a narrow strip of land and beach. The cliff at this place is about 30 feet high. The pit (A on map) was 4½ feet deep, 2¾ wide, with nearly perpendicular sides. It was closely packed with scallop shells to within eight inches of the

[1] Practically all the historic references to the Indians of this region as well as a bibliography of the subject can be found in "*Notes on the Wampanoag Indians*," by Henry E. Chase. (Smithsonian Report, 1883.)

surface. At the bottom in a layer of coarse charcoal, mixed with the shells were numerous fish, bird, and cracked mammal bones. Just above the charcoal lay the lower jaw of a dog with the bones of the feet directly under it. No other parts of the skeleton were in the pit.

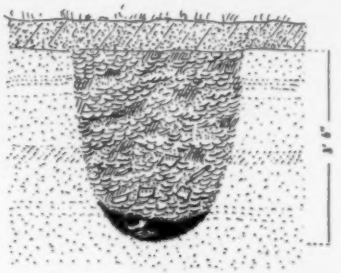


FIG. 5.—Typical shell pit, Pit A.

There were also many fragments of pottery (fig. 6), and a notched stone net sinker found in the talus at the foot of the bluff probably came from the pit.

From this point west the cliffs were barren of archeological interest, though at one point, B, where I had been told the cliff was breaking away through an Indian burial place, I saw what may have been a grave, but it had been carefully dug out before my visit. At various points along this shore where the soil was exposed, chipped points of stone, rejects, and many flakes were found.

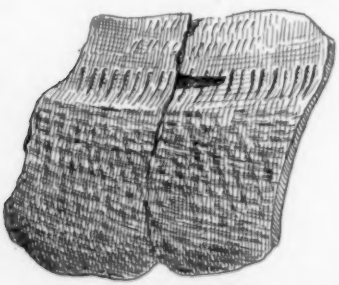


FIG. 6.—Sherd from Pit A.

On the sound side of the island no archeological sites were seen after leaving Menemsha creek until the "Brickyard," C, was reached. Here in a washout near the brook I found several quartzite points and quantities of chips on what may have been a camp or workshop site, the location being well adapted for either. From the creek west to Gay Head no indications of camps were seen, but it is said by the residents that many stone implements have been picked up near the lighthouse.

Menemsha pond is a shallow tidal pool two miles long by one

wide, the land gradually rising from the shores, except on the north side where a narrow strip of sand dunes and marsh separate it from the sound. This pond and Nashaquitsa pond with which it is connected nearly divide Gay Head from Chilmark. Nashaquitsa is cut off from the ocean by a few rods of beach, Menemsha emptying into the sound through the creek. The east shores of both ponds show almost uninterrupted evidence of aboriginal occupation, in the shell deposits, chipped stone, etc. There are spots where the soil is almost black with decayed débris, and littered about are broken shells, bones, and charcoal which would indicate permanent village sites. One of these is on the Vincent farm, D; another at the spot, E. Here the black soil reaches a depth of over a foot and the bounds are very clearly defined, the surrounding soil being yellow loam mixed with sand. A third site is located at F, near the small brook, and still another at P on the west shore, where I found traces of an ancient cornfield. The hills and rows retain their original shape, some fifty hills being counted. Several of these were opened, showing the soil to be very black and full of broken shells and splintered bones. Its aboriginal origin would seem to be confirmed by the fact that in size and location of the plot there is nothing that would attract a white farmer.

At the site D, on the Vincent farm, I found thirty points and rejects on the surface, and saw at the farmhouse a stone mortar, a pestle, and many more points that had been taken from the spot, and was told that a great many objects had been found and given away. A splendid boiling spring is on this ancient encampment. As the site E was given over to a cornfield and vegetable garden, no digging was attempted, but I picked up from the surface a large grooved stone (pl. I, fig. 16), a fragment of a soapstone pot, and several points, as well as some notched stone net sinkers. Mixed with the soil were many cracked animal bones.

On the site F a portion of the soil had never been cultivated. This is not unusual here as in exposed places if the sod is broken the surface soil blows away leaving barren patches of sand. Here were found what appear to be two house rings plainly defined

(fig. 7). They measure approximately 17 feet in diameter, and are formed by a ridge of earth mixed with the shells and other refuse, two feet wide, and six to seven inches higher than the surrounding surface. The best preserved of the two rings showed a break where the door had evidently been. I did not have permission to explore these sites, but some digging with a trowel in the center of one ring failed to show a fire hole or hearth, though I did not go very deep. The centers of the rings are littered with broken shells, bone, and chips, but the refuse stops abruptly at the outer edge, a proof that the land has not been ploughed.

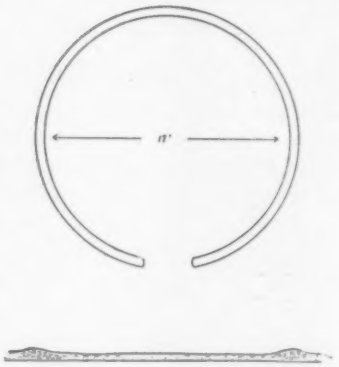


FIG. 7.—Plan of house ring, Site F.

The younger Mayhew briefly describes the houses of the Indians in 1650, as "made with small poles like an arbor covered with mats, and their fire in the midst, over which they leave a place for smoake to go out at."[1]

I was fortunate in obtaining the permission of Mr. Ernest Flanders to dig at will in his pasture land on what is known locally as Pease's point, a plot at the eastern end of Menemsha pond, containing roughly forty acres of fairly level land enclosed on two sides by stone walls, the pond forming the other and longest boundary. Along the shore the land rises in an abrupt bank from 15 to 20 feet in height, except for a few rods at the extreme east of the pasture where it meets the pond in a gentle slope. The soil is either sand or gravel covered by a thin layer of loam. A part of the pasture must have been under cultivation at one time as the remains of an ancient cellar and numerous heaps of field stones would testify. At no point did surface indications offer any great inducements to dig. The discovery, however, of a bleached frag-

[1] *Light appearing*, etc. (London, 1651).

ment of human skull some fifty yards back from the shore led to the finding of two graves; search for other bones leading, naturally, to a patch of exposed sand in the side of a bank on the shore where other fragments were found, and a little trenching revealed the graves from which they had been dislodged. (N. on map.)

Grave 1 (fig. 8), which contained a double burial, lay just at the top of the bluff, erosion of which had left the skull of one skeleton covered by only a few inches of sand so that the hoofs of sheep had crushed and scattered parts of it. The second

FIG. 8.—Grave 1, Pease's Point.

skeleton rested in the undisturbed half of the grave extending under the grass land. The first skeleton uncovered was that of an adult male well advanced in years. All the bones except the fragments mentioned were in place and well preserved. The body had evidently been placed in the grave in a reclining position with the head some fifteen inches higher than the feet, the knees drawn up to the chest and the hands placed close against the face.

The second skeleton, that of an adolescent, lay but a few inches from the first and in the same position, the bones being undisturbed

and well preserved, except the skull which had been slightly flattened by the weight of earth above. Both skeletons lay on the right side with the heads west and facing the south. No objects were found in the graves. The cut made above the second skeleton showed a strip of darkened sand probably caused by the decay of bark, mats or skins, placed over the bodies at the time of burial.

FIG. 9.—Grave 2, Pease's Point.

Grave 2 (fig. 9) was twelve feet east of 1 and just at the edge of the grass land. It resembled grave 1 in all essential details, including the band of dark sand above the bones, and held a part of the skeleton of an adult male. The pelvis and the bones of the lower limbs (with the exception of those of the right foot) were missing. What remained of the skeleton lay in natural order with the bones in good condition. No indications were seen, either

on the surface, or in the sand between the foot and other bones of an earlier opening of the grave, but a thorough search for the missing portions of the skeleton was without success.

A few feet south of these burials and midway between them, a small hearth of stones was uncovered just below the loam which is here ten inches deep (pl. II, fig. 2).

In trenching through the level grass land near the hearth, three bowl-shaped pits were encountered, as follows:—

Pit 1. Three feet deep, held blackened earth or sand in which were found bird, fish, and cracked mammal bones, a bone implement (fig. 10), a small object worked from turtle plate (fig. 11) also a few shells and fragments of pottery.

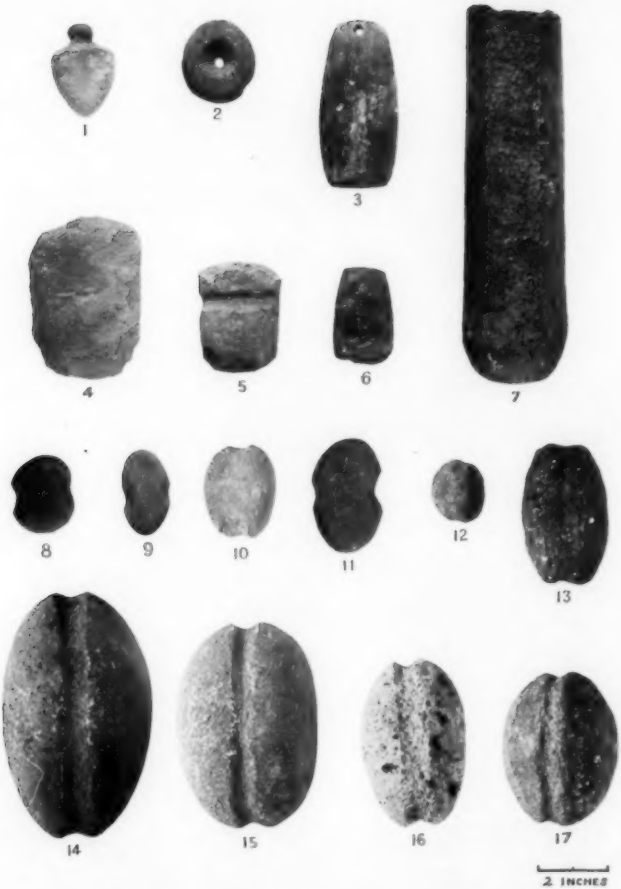
Pit 2. Of the same depth as pit 1, was filled with a compact mass of shells, mixed with which were many fish bones and an occasional splintered mammal bone.

Pit 3. Seven feet east of the hearth was similar to pit 1 both in size and contents. A rude grooveless axe (pl. I, fig. 4) and a grooved sinker (pl. I, fig. 12) were found, and near the bottom a piece of bone, suspected at the time to be human, which has since been identified by Dr. Hooton as a portion of a human left humerus.

Further digging here promising no results, attention was turned to an exposure a few rods east, where a skeleton was said to have been found in 1908, in the hope of recovering which, trenches were run through nearly all the exposed sand and through the grass land until the hard gravel was reached. Two hearths and seven pits were found, but no signs of a burial. The hearths were much larger than the one found near the graves, averaging four feet in diameter, the stones being badly cracked and burned.

FIG. 10.—Bone implement from pit, Site N.

The pits were of the same type as those already described, their contents varying but little, except pit 1 which was 4½ feet deep by 4 feet in diameter, and was filled with sand mixed with powdered charcoal, giving it a hue in sharp contrast to the yellow sand in which it had been dug. Except for a large quartz point found



NET SINKERS AND OTHER ARTIFACTS FROM PITS AND GENERAL DIGGING: 1, PLUMMET, PIT 3, SITE 2; 2, PERFORATED STONE, PIT 4, SITE 2; 3, PENDANT; 4-6, AXES FROM PITS; 7, FRAGMENT OF PESTLE; 8-13, NOTCHED STONE NET SINKERS; 14-17, GROOVED STONE NET SINKERS

near the bottom of the pit, the black sand was practically free from objects of any nature.

In pit 2, amongst other bones, were portions of the skeleton of a dog, also a small slate pendant.

Pit 3 held bones of deer, birds, and fish, and a large piece of bone, that may have been used as an implement, its shape suggests a pick.

Pit 4 was filled with shells.

Pit 5 contained the usual assortment of bones and shells.

Pit 6 was also a refuse pit from which a few potsherds were secured.

Pit 7 was a shell pit.

A level sandy spot about midway in the pasture's shore line was trenched, four pits being uncovered and two large stone-paved hearths.

A number of points, a notched stone sinker, and a quantity of rejects were found during the excavation of the pits but no objects of especial note.

FIG. 11.—Turtle plate object from pit, Site N.

Three trial holes were sunk in the pasture adjoining Pease's point to the south, each hole disclosing a pit, experience having shown that pits could be located in sandy soil by the fresh appearance of the grass above them, the charcoal and other matter they contain retaining moisture better than the surrounding earth. In one of these pits was a large number of potsherds, showing cord or fabric marking, which from their position seemed to be the remains of a large cooking pot which had been broken while in the pit. A thick crust of carbon adhered to the inner side of the pot as if the contents had burned on. Being unable to communicate with the owner of the pasture, work was discontinued here.

Through the kindness of Mr. Ernest Mayhew, we were allowed partly to explore a small site, Q, on the eastern shore of Nashaquitsa

pond, a continuation of Menemsha pond. The site lay at the head of a low marsh, some distance from the shore, rising ground on three sides affording shelter from the north winds, a spring brook along one side supplied excellent water. The surface showed no signs of the prolonged occupation that the black soil noted at other points would indicate, although chips and flakes were plentiful.

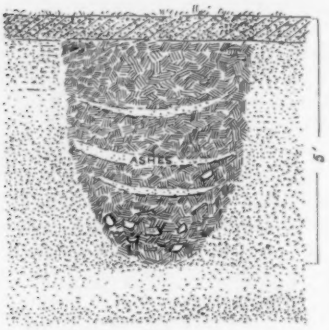


FIG. 12.—Typical refuse pit, Pit 3, Site 2.

A hearth was encountered at the beginning of our first trench and later five pits. The hearth resembled those described and lay just below the loam which is here less than a foot deep.

Pits 1 and 2 held shells and the usual bones.

Pit 3 (fig. 12) contained black greasy soil in which were particles of charcoal and strata of ashes. In excavating this pit there were found a small stone plummet (pl. 1, fig. 1), three notched stone sinkers, a bone point and a large variety of bones, including those of dogs, deer, turtles, birds, and fish.

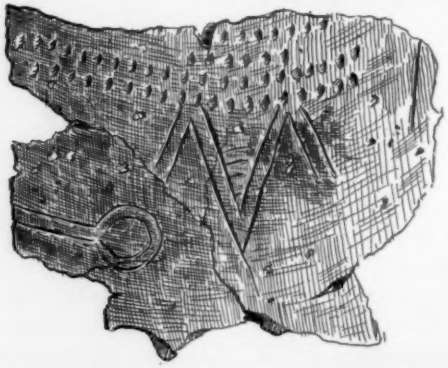


FIG. 13.—Fragment of incised pottery from trench, Site 2.

Pit 4, a refuse pit in which shells predominated. In this were found a very

small grooved sinker and a perforated disk-shaped stone (pl. 1, fig. 2). From the trench approaching this pit fragments of a large pot were taken (fig. 13), although badly broken by my assistant in the course of removal, the pieces, when joined together, show an incised design not usually found in this region.

Pit 5 was a shell pit and held no objects worth noting.

A short distance east of the site just described, a house site was found on the bank of the brook. It occupied a small terrace in the bank and was marked by a crescent-shaped ridge of sea snail shells blackened by fire.

Along the east shore fronting the village sites are many pits and outcroppings of shell deposits; from one of the pits I took several large fragments of a pottery vessel (fig. 14), the rim showing markings at intervals along the edge made by pressing the side of a round tool into the soft clay, and a series of impressions made with the end of the tool extended around the pot about one inch below the rim. I also found nearby, a fragment of the rim of a steatite pot having a notched edge.

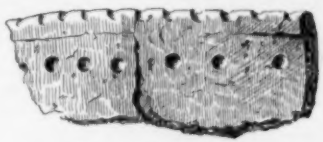


FIG. 14.—Sherd from pit.

In the course of general digging in the sites described a number of points (fig. 15), rejects, worked stones, and fragments of pottery

FIG. 15.—Chipped points from pits and general digging.

were found. It seems worth recording that no objects of white men's use or manufacture were found in any of the pits or shell beds, and but one small fragment of European glazed pottery in the general digging.

Oyster pond derives its name from the oysters which are still found there in small quantities and are said to have been abundant in early times. I found but two small heaps of shells and these seemed to be but the remains of a single meal. As none of the land is under cultivation and a great part of it covered by a thick growth of bushes, large deposits may exist.

The most interesting feature of the section is what is said to be the remains of an unfinished canal attempted by the Indians to connect Watcha with Oyster pond (fig. 16). Tradition has it

FIG. 16.—Sketch of Canal: a, Watcha pond; b, Canal; c, Oyster pond; d, Ocean.

that both ponds were at one time connected with the ocean and that Watcha pond was cut off by the building up of the beach after an unusual storm. The canal was undertaken to allow the access of fish to Watcha pond through Oyster pond. The shortest distance between the ponds is about 400 feet and at this point there appears a trench 30 feet across and from 6 to 10 feet deep. The earth on either side forms a ridge two or three feet higher than the surrounding surface, as would be the case had the earth removed been thrown or carried to the sides of the trench. The amount of industry required for this undertaking is much greater than we are accustomed to ascribe to New England Indians, but the following historic reference to methods of fishing would seem to give the tradition some weight.

These hospitable natives led them to Great Pond, and showed them their manner of taking fish, which was as follows: A passage was opened from the sea into the Pond and through it the fish entered, There are many coves in this pond, at the entrance of the coves the Indians placed hurdles under water, in a horizontal position, and when the fish had run over them into the coves they went in their canoes, lifted the hurdles upright by means of which they prevented the escape of the fish, and with their spears struck them in the mud.[1]

Shell Deposits

Those examined can be divided into three types: heaps, beds, and pits, the greater number coming under the second head. All were rather shallow and contained besides the shells, fish, bird, and cracked mammal bones, fragments of pottery and chipped stone and traces of fire. The large deposits were made up of the remains of several species of shells as a rule, as were those near the village sites, while the small isolated heaps and pits had only shells of a single species in every case.

Northeast from the house ring at G are several small mounds about 2½ feet high by 19 feet in diameter. These were on land that had not been disturbed. They are quite near each other and suggest by their arrangement the refuse deposits of a group of huts. They are composed of the shells of the scallop (*Pecten irradians*), quahog (*Venus mercenaria*), clam (*Mya arenaria*), and sea snail shells (*Lunatia heros*), mixed with the usual animal bones, and contain many chips and flakes of stone. Another heap, H, is composed entirely of scallop shells.

Two interesting small shell deposits, K, were discovered on the stretch of sand dunes that form the north shore. These had apparently lain undisturbed since their making and had been only recently uncovered by the shifting of the sand. These contained in each case, about two barrels of quahog shells mixed with charcoal. As there is no fresh water near here it is hard to understand why this spot in the sand dunes should have been chosen for a campsite unless perhaps the Indians were harvesting cranberries which grow quite abundantly on the level stretches, and wished

[1] "Description of Duke's County," *Mass. Historical Coll.*, Vol. III, Second Series, p. 81.

to camp near the scene of their operation. No objects or bones of animals were found with the shells.

There are many small deposits near the creek. From one, on which the boathouse of Daniel Look is built, I secured a bone point (fig. 17b).

The largest deposit under the head of beds is at I. At this point, covered by a foot of vegetable mould or loam with no surface indications of its existence, a shell deposit was found which seems to be much older than any previously examined. The exact area of the bed was not determined but it was traced in one direction for 100 feet. It runs in depth from 2 to 4 feet, the bottom resting on sand and gravel of a bright rust color, due to the presence near by of quantities of bog iron. The bed is composed of a mass of oyster shells in which digging was difficult, and although a spade could be forced through the shells owing to their decomposed condition, the compact nature of the deposit made the work very slow. Burned and broken stones and bones of mammals and fish were found throughout the heap, but the only artifacts secured were two broken points and some fragments of a perforated gorget (fig. 18c). Only a very small portion of the bed was examined. Oyster shells were found but seldom in the pits explored and I do not recall finding them at all in the other shell-heaps reported.

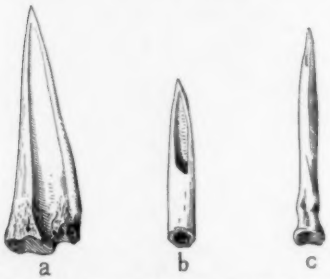


FIG. 17.—Bone implements and points from pits.

Another large shell bed was found on Gay Head, at the point marked J, on the map. It covers about quarter of an acre and is mostly overgrown with bushes. The shells vary in depth from 6 to 18 inches. All the varieties found in the nearby waters are here present, though portions of the heap were made up almost entirely of scallop shells. At one point in our digging we encountered a mass of seaweed, bleached white, but easily recognized as the same weed now

found about the shores of the pond. It appeared to have been a bundle 4 feet long, 3 wide, 3 inches deep. It lay at the bottom

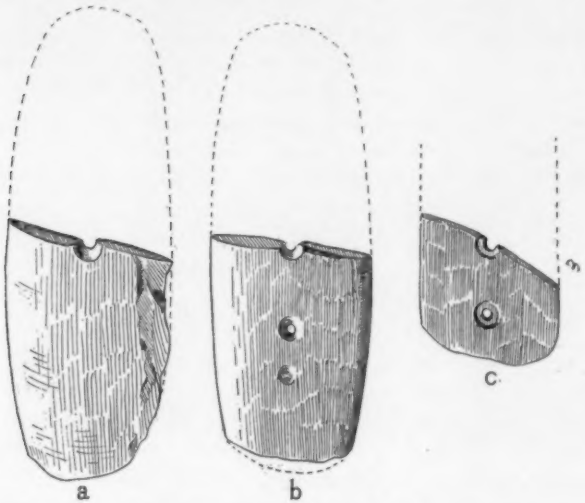


FIG. 18.—Pierced tablets from shell-heaps.

of the deposit and may have been placed there for a bed. Fire-cracked stones were numerous as well as fragments of rudely decorated pottery (fig. 19). The search for stone and bone implements was poorly rewarded. Three notched stones, what may be part of a small grooved axe, a fragment of worked stone (fig. 18a), several hammerstones and a few rejects were all that were found in the portion explored.

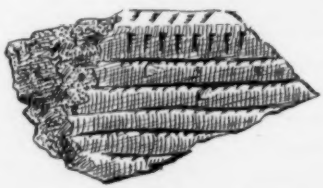


FIG. 19.—Sherd from shell-heap.

BURIAL PLACES

Three burial places occur near the ponds, one occupies a small knoll at M, the second lies about quarter of a mile south at L beside

a disused road that crosses the pasture lands to a fording place at the narrows between the ponds, and a third at O on the Vincent farm a few rods south of the state road. The graves are marked by small rough field stones of various shapes and the plots have long been known to the natives as ancient Indian burial places, the owners of the land on which they are located respecting them as such, having refrained from ploughing into or otherwise disturbing them. The arrangement of the stones is so irregular and they are so like what one would expect to encounter in pasture land, that they do not appear to be cemeteries even after being pointed out as such. The plot at M is the smaller of the three and as indicated by the stones may contain ten or fifteen graves. The burial ground at N covers an area about the size of a town lot. There are here about fifty stones large and small. Plot O (plate II, fig. 1) on the Vincent farm is next in size and has thirty stones. Thinking that these stones possibly mark later Christian interments while the place may have been also used at an earlier time for Indian burials, and wishing to make sure that they had been used at all, I obtained permission to dig in the plot marked N on the map.

Not wishing to disturb the cemetery needlessly, if it proved to be one, I started a trench at the southeast corner just outside what seemed to be the bounds, and worked towards what appeared to be a headstone. Here at the depth of 2½ feet were found rusty wrought iron nails, and 16 inches deeper, parts of a skeleton. The bones were badly decomposed but enough remained to show the body had been buried in a horizontal position. The nails found are probably all that is left of the coffin. The stone I had supposed to mark the head of the grave lay directly over the middle of the skeleton so in this case it seemed to have been placed with little regard to the customary method of marking modern graves. Restoring the ground to its former condition as nearly as possible, a trench was started on the opposite corner just outside the plot. Here at the depth of 18 inches the bones of a young person were uncovered. The skeleton rested on the right side with the knees drawn up and the hands placed before the face. The skull had been crushed by the weight of earth or by passing wheels, other-

1. CEMETERY O, SHOWING ROUGH FIELD-STONES MARKING GRAVES
2. STONE HEARTH NEAR GRAVES, PEASE'S POINT

wise the bones were in perfect condition. There were two stones within a few feet of this grave but in no way marking it. No objects were found with the bones. This grave, which was aboriginal without doubt, supports my theory that burials had taken place here prior to those marked by the stones. I was unable to continue the investigation as the owner of the land objected to further digging and permission could not be secured to explore the other plots mentioned.

Two small cemeteries near the Brickyard were visited and photographed. They are of the same type as those already described, the graves being marked by rough field stones set without any apparent order. No exploration of these sites was attempted. The plot marked R on the map had been disturbed and in the filling above the grave were fragments of wrought-iron nails so that there is little doubt that some of the graves contain Christian burials From the location and general appearance of the plot at S there is reason to believe that digging would reveal aboriginal as well as Christian burials, as was the case at N.

In connection with the burial places, it is said that on Gay Head there are many single graves marked by stones, about which fires had been built to drive away evil spirits that might disturb the dead. I saw stones about the size of those that marked the graves already described which showed traces of fire, but as I had no opportunity to investigate by digging, I am not sure they mark graves. These graves, if they are such, are supposed to antedate the Christian burials.

PEABODY MUSEUM,
CAMBRIDGE, MASS.

NOTES ON SKELETAL REMAINS FROM MARTHA'S VINEYARD

By E. A. HOOTON

THE skeletal material forming the subject of this report comprises the remains of three individuals, two old men and a boy. The men were muscular individuals, with long heads and well-developed brow ridges. The cranial type is one frequently met with in New England Indians, especially in the Maine shell heaps. The boy was very large for his age. His skull is broader than any other New England Indian cranium in the Peabody Museum collection. The cranial index is 81.5, but with the development of brow ridges and strengthening of the muscular attachments of the occiput, at maturity, he would probably have had a somewhat lower index. He represents simply an individual variation of the type.

Skeleton No. 1 (59488)

Cranium. This is the skull (pls. III and IV) of an aged male. It exhibits no deformation, and has been preserved entire.

The frontal region is broad and moderately retreating. There is a slight median eminence. The sagittal region is rather elevated and the sagittal suture lies in a slight furrow. The parietal bosses are well developed. About 3 cm. below bregma and 1 cm. behind the coronal suture on the left parietal is an old lesion of small size. The temporal region is rather compressed and the wings of the sphenoid are deeply furrowed. The occipital region is flat at lambda and below moderately convex with well-developed muscular attachments. The mastoids are large.

The serration of the sutures is simple. The coronal is completely obliterated in the pterion regions, and here and there along its entire length. In the sagittal and lambdoid sutures obliteration

FRONT AND BACK VIEW OF SKULL NO. 59488

SIDE AND TOP VIEW OF SKULL NO. 59488

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has begun. The pterions are in broad H, and there is a large epipteric bone on the right side.

The supra-orbital ridges are well developed medially, and laterally the superior orbital margins are considerably thickened. The nasal depression is slight; the bridge of the nose high and broad. The ends of the nasal bones (nasalia) are depressed and irregular. The nasal aperture is narrow, with a well-developed spine and dull lower borders. The orbits are low and broad, with thickened margins, and there are traces of the infra-orbital suture. The sub-orbital fossae are but slightly marked. The malars are large, and the right side has a very large processus marginalis.

Most of the teeth in the maxilla were lost in life, and the alveolar arcade had undergone considerable absorption. In the mandible the right median incisor and canine remain, and are much worn. The palate was probably broad U-shaped.

The base of the skull shows deep glenoid fossae with a slight post glenoid process. The styloids have been broken away but were evidently small. The depression of the petrous portions of the temporal bone is slight. The foramen magnum is large and asymmetrical, with the edges much thickened. The condyles show arthritic flattening.

The mandible is large, but had undergone a good deal of senile reduction. The ascending rami are broad and the sigmoid notch is deep. There is a well-developed median chin. The condyles are flattened.

Long Bones, etc. These include the bones of the upper extremity, cervical and dorsal vertebrae, and foot bones.

Humeri. These are large and muscular bones. Just below the head of the right humerus there has been a necrosis involving the anterior and medial side of the diaphysis and the medullary cavity. The cancellous tissue has been destroyed and the whole presents the appearance of an infection due to a tumor.

Scapulae. Fragmentary. Large and muscular with high acromion processes.

Vertebrae. These present extensive marginal exostoses due to arthritis.

Foot Bones. Bones of the right foot only. The astragalus is high, and there are extensive supplementary articular facets on the medial side of the neck, showing that the man was in the habit of squatting. Viewed from above the external malleolar facet shows unusually great obliquity. The calcaneum is high with a well-developed sustentaculum.

Estimated Height. On the basis of Pearson's formula (h), the height of this man, based on the length of the left humerus and radius, was about 162 cm. Probably, however, if the bones of the lower extremity could be taken into consideration, the estimated stature would be considerably augmented.

Skeleton No. 2 (59489)

Cranium. The remains of the cranium include the frontal bone, the temporal bones, the face and the mandible.

The frontal region is broad and moderately retreating. The sutures of the cranial vault were probably largely obliterated. The temporal bones are massive and the mastoids large. There are three large retro-mastoid foramina and two small ones on the right side, on the left side there are two large foramina.

Medially the supra-orbital ridges are enormously developed. The lateral parts of the brow ridges are also large, and are separated from the median eminence by deep grooves terminating in the supra-orbital notches. The nasal depression was slight. The nasal bones are missing. The bridge of the nose was of moderate height and width. The nasal aperture is of medium width with a well-developed spine and dull lower borders. The orbits are of medium height. The malars are large and the zygomae thick and heavy. The sub-orbital fossae are of average depth. In the maxilla most of the teeth were lost during life, and the alveolar arcade largely absorbed. The only tooth remaining in the maxilla is the left posterior premolar which is much worn. The palate was U-shaped. Dental abscesses have affected the alveolar border in the region of the right canine and the left third molar. In the mandible the incisors, canines, premolars, and right third molars are *in situ*. All these teeth are much worn down; the right pre-

molars exhibit caries, and inflammations have affected the arcade about the roots of the first and second right molars.

The glenoid fossae are deep and there is a well-developed post-glenoid process. The Tuber Culum articulare is unusually large. The styloids which are broken away, were very large. A fragment of the occipital bone, including the basilar process and the left side of the foramen magnum, shows that there was no post-condyloid foramen on the left side. The occipital condyle is arthritically flattened.

The mandible is very large with a well-developed median mental process, broad rami, and a deep sigmoid notch. The condyles are somewhat flattened and slope from without downward and inward.

Humeri. These are large with very well-developed muscular attachments. The inferior articular surfaces show arthritic osteophytes.

Radii and Ulnae. The bones of the forearm give evidence of a great muscular development.

Vertebrae. Most of the vertebrae have marginal exostoses.

Pelvis. The pelvis is distinctly male. The sacro-sciatic notch is narrow; the prae-auricular sulcus is slightly developed. The sacrum is long, narrow, and straight.

Femora. The femora are large and muscular with well-developed pilasters. On each there is a pronounced crista hypotrochanterica, and platymeria is very marked. The head and neck in both instances show a most unusual torsion, which amounts to 47° in the right femur and 48° in the left. The lower two thirds of the diaphysis of the left femur shows a pathological deposition of bony tissue.[1] The condyles of both femurs are flat, and the shafts present a greater degree of curvature than is usual.

Tibiae. These are very platycnemic and have extensive supernumerary articular facets on the anterior lip of the lower articular surface.

Foot Bones. The bones of the feet are large. The calcaneum has an excessively developed sustentaculum tali; the astragalus has "squatting facets" on the neck.

[1] Dr. Arthur Keith is inclined to diagnose this condition as syphilitic.

CRANIAL MEASUREMENTS

Sex	No. 59488 ♂	No. 59489 ♂	No. 59490 ♂
Approximate age	Past middle life	Past middle life	12–14 yrs.
Deformation	None	None	None
Glabello-Occipital length	187	—	179
Maximum width	137	—	146
Basion-Bregma height	141	—	—
Auricular height	121	—	112
Minimum frontal diameter	99	99	—
Diameter bi-zygomatic	(c.) 138	—	—
Min. breadth ascending ramus	39	42	32
Bigonial diameter	(c.) 96	(c.) 100	100
Mean angle ascending rami	117°	118°	127°
Height of symphysis	(c.) 38	(c.) 35	30
Bi-condylar width	(c.) 134	—	(c.) 122
Condylo-symphysial length	109	(c.) 120	106
Orbits (right)			
height	32	—	—
breadth	43	—	—
Nasal Aperture			
height	50	—	—
breadth	23	—	21. ?
Basion-Nasion	110	—	—
Palate			
external length	—	—	53
external breadth	—	—	68
Maximum circumference (above brow ridges)	521	—	—
Arc			
Nasion-Opisthion	383	—	(c.) 373
vertical transverse	318	—	—
Indices			
cranial	73. 2	—	81. 5
height-length	75. 4	—	—
height-breadth	102. 9	—	—
mean orbital	76. 3	—	—
nasal	46	—	—
external palatal	—	—	128. 3
cranial capacity	1,480 c.c.	—	—

Estimated Height. On the basis of Pearson's formula (f), the height of this man was about 175 cm.

SKELETON NO. 3 (59490)

Cranium. The cranial vault is incomplete and somewhat warped; the skull base is missing; the facial skeleton is fragmentary but the palate with the teeth *in situ*, and the mandible, are preserved (pl. v). The subject was a boy thirteen or fourteen years old at the time of his death. The second molars had just erupted and the epiphyses of the long bones are separate from the shafts.

The frontal region of the skull is broad and bulging. The bosses

SIDE AND TOP VIEW OF SKULL NO. 59490

are prominent. The sagittal region is slightly elevated, very broad, and with the parietal tuberosities well marked. The temporal region is full. The occipital region is moderately convex, and the muscular attachments are, as yet, little developed. The serration of the sutures is very simple and they are all open. There are no Wormian bones. The pterions are in broad H; there are neither parietal foramina nor retro-mastoid foramina; the mastoids are little developed.

The supra-orbital ridges are undeveloped, but the glabella is prominent. The nasal depression is very slight and the bridge of the nose seems to have been rather broad and low. The nasal aperture was broad with a well-developed spine and dull lower borders.

	No. 59488		No. 59489		No. 59490	
	R.	L.	R.	L.	R.	L.
FEMUR						
Length, bi-condylar	—	—	482	494	415	412
					(without head)	
Length, maximum	—	—	489	499	421	420
Diameter of head, maximum	—	—	50	50	—	—
Sub-trochanteric diam.,						
antero-posterior	—	—	27	25	23	22
lateral	—	—	38	40	30	31
Middle shaft diam.,						
antero-posterior	—	—	32	—	28	28
lateral	—	—	27	—	24	24
Angle of torsion	—	—	47°	48°	45°	32°
TIBIA						
Length maximum (minus spine)	—	—	391	—	349	—
Middle diameter,						
antero-posterior	—	—	37	37	29	30
lateral	—	—	22	23	22	21
Nutritive foramen diam.,						
antero-posterior	—	—	44	40	34	33
lateral	—	—	26	24	23	23
FIBULA						
Length maximum	—	—	—	376	—	—
HUMERUS						
Length maximum	323	322	—	341	—	—
Max. diam. articular head	45	46	—	47	—	—
RADIUS						
Length maximum	256	254	262	266	—	—
ULNA						
Length maximum	279	—	—	286	—	—
INDICES						
Femur						
Middle index	—	—	118.5	—	116.6	116.6
Index of platymeria	—	—	71.0	62.5	76.6	70.9
Tibia						
Middle	—	—	59.4	62.1	75.8	70.0
Index of platycnemia	—	—	59.0	60.0	67.6	69.7

The mandible is infantile, but large. The third molars had not yet erupted, but the median incisors and first molars show some wear. The wear on the median incisors slants from behind downward and forward, showing that the bite was not "edge to edge." The quality of the teeth is excellent. There are four cusps on the upper molars and five on the lower. The incisors and canines show the typical shovel form which Dr. Aleš Hrdlička has demonstrated to be a characteristic of the American race. There is a slight crowding of the lower incisors. The palate is parabolic in form and of medium height.

The glenoid fossae are deep and there is a small dehiscence in the floor of the auditory meatus on each side.

Other Skeletal Parts. These are all of good size with the muscular attachments as yet little developed. The femora show a developing pilaster, incipient platymeria and flattened condyles. The torsion of the head and neck, as in the preceding subject, is great. It amounts to 45° in the right femur and 32° in the left. The occurrence of such an unusual amount of torsion of the femoral head and neck in both of these skeletons, would indicate that this character is possibly something more than an individual variation. Pronounced positive torsion of the femoral neck and head is often observed in the American Indians, but such extreme torsion is unusual. Examination of a number of femora belonging to New England Indians does not seem to show that this character is any more pronounced in remains from this region than in those coming from other parts of the country. No entirely satisfactory theory explaining the causes of femoral torsion has been advanced.

Estimated Height. On the basis of Pearson's formula *c*, the height of this boy, based on the length of the right tibia, including both epiphyses, was about 162 cm. This would make him very large for his age. According to Boas the average stature of 15 year old boys of the larger North American Indian stocks is 158, 0 cm. and of white boys (Worcester) 162, 0 cm. On the evidence of the teeth and long bones this boy was in all probability younger than 15 years.

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HENRI BEUCHAT

HENRI BEUCHAT

By C. M. BARBEAU

THE forlorn hope that some of the lost members of the ill-fated Canadian Arctic Expedition might reappear has long been abandoned and it is with regret that we here record the presumed death of Henri Beuchat, one of the two ethnologists of the expedition.

Although still a young man, whose career lay more in the future than in the past, M. Beuchat had deservedly won a high reputation as an anthropologist. In him American archeology and ethnology lose one of their most brilliant European exponents. We are indebted to Madame M. Hollebecque, of Paris (France), for much of the following biographical material.

If M. Beuchat's personality and achievements were to be characterized in a few words, we would describe him as a modest and most brilliant self-made man of science, who by sheer determination and talent acquired a vast and critical knowledge of many subjects and achieved success in the face of adverse circumstances.

Born in Paris, in 1878, his school education came to a premature end when he was only thirteen years of age. His naïve but keen interest in books then determined his choice of a calling; and he became a compositor in a Paris printing office. At the age of eighteen the death of his father and his responsibility for the welfare of his family induced him to accept the more remunerative position of accountant in a business concern. His military training was next undergone in his twenty-second year. Bent as he was to become a man of learning, these years of early assiduous manual labor, although somewhat impairing his health, were not without benefit for him. All his spare moments were devoted to his many-sided hobby: books, museums, and lectures. In the printing office he developed the technical qualities of neatness and precision, and his skill as a draughtsman, which enabled him later to provide his

own manuscripts or publications with maps and engravings from his own hand. On the very subject of the printer's types his curious and searching mind soon began to speculate. He thus undertook a minute study of the history of printing and writing generally. Other symbols and methods of writing also appealed to the young typographer; and his greatest enjoyment, when he was a mere adolescent, consisted in deciphering hieroglyphic, cuneiform, Syriac and Nagari characters and alphabets, and compiling such data in notebooks. Through the subsequent changes in his life he remained interested in this study, which later embraced that of the Mexican and Central American systems. In later years he was still gathering materials and fondly elaborating a plan for a forthcoming work on 'writing' (*L'Ecriture*). This hobby led him into the study of living languages. While he was giving French lessons to Danish, Swedish, Norwegian and other students in Paris, he was repaid by lessons in their own languages. From this starting point his curiosity and power of assimilation embraced many other languages, including those of Central and South American tribes.

A certain modification in his lines of interest followed his passage from the printing to the business offices. The business drudgery gave life, in his imagination, to figures, formulae, and calculation. After he had mastered the elements of mathematics, his attention gradually turned to astronomy and chemistry. It is, indeed, astonishing that a self-made scholar, even when gifted with unsurpassed memory and judgment, should not have lost his bearings in the midst of such diversified subjects. Where others are usually submerged, however, he was building and storing for the future. Mere facts were interesting to him only as related to others; and instead of being stored pell-mell in his brain they were assimilated and classified. This explains how he developed into a type of scientist that has well nigh disappeared now, and won distinction in fields of science quite divorced from his own anthropological research. Thus, in 1913, he won the '*Prix des Dames*' in astronomy, for his many services since 1894 in attending and directing the weekly meetings of the Société Astronomique de Paris. And, as a pastime,

he was annotating and correcting Mendeleyeff's data on chemistry, and preparing a scientific novel entitled *Les Cristaux*, in which he was embodying several of his philosophic ideas and hypotheses.

Notwithstanding the exclusiveness of the Paris academic and scientific circles, the reputation of young Beuchat began to spread in many quarters, and won him the favors and protection of many noted personalities, notably the Duc de Loubat, la générale Bocher, M. le Souëf, and Léon de Rosny. In 1902 he became *élève titulaire* at the Section des Hautes Etudes, La Sorbonne; and he assimilated in his own way the anthropological views and methods of the Durkheim school, especially under the guidance of his esteemed masters and friends, MM. Mauss, Hubert, and others. Lack of space here forbids the detailed account of his arduous and trying career as anthropologist in Paris. While he was stubbornly pursuing his own researches on American archeology and ethnology, his energy was often taxed to the utmost by his professional duties and many tasks of secondary importance. In 1902–3 he became the secretary-treasurer of *La Revue des Etudes Américaines*, and was entrusted by M. le Souëf with the preparation of a lengthy illustrated manuscript on Mexican art. After receiving a diploma at the Ecole du Louvre, he was appointed secretary of *La Revue de Paris*. The university ruts and regulations barring him from a university function, for which he was otherwise qualified, forced him to accept an insufficiently remunerative post in the Fine Arts Department of the French Government. In this capacity he had to attend to exacting drudgery in connection with the administration and classification of the ancient monuments of France. Other irksome tasks also consumed much of his time, such as the preparation of maps showing the distribution of racial and cultural elements in America for the Musée de Saint-Germain-en-Laye, the restoration of the Marquesas islands hall in the Louvre, and the translation, in 1912, of Nordenskiöld's work on the Gran Chaco Indians (*La vie des Indiens au Grand Chaco*, Paris, Delagrave).

Although only at the beginning of his productive career as an Americanist, his versatility, clarity of ideas, and creative talent are shown in his essays, reviews, and works, the principal of which

is the remarkable and unique *Manuel d'Archéologie Américaine* (Paris, Picard, XLI, 773 pp., 1913), the only ambitious classificatory work on American archeology in its wider sense yet attempted.

The bibliography of his publications is the following:—

In the *Revue des Etudes Américaines* (1902): 'Notice sur quelques manuscrits mexicains de la Bibliothèque Nationale de Paris'; and 'Notice analytique sur les travaux de Lord Kingsborough' on Mexican antiquities. (1903): 'Les peuples Chahta-Maskokis' (Jan.); 'Quelques traditions des Eskimos de l'Alaska' (April); 'Quelques légendes des Eskimos de la terre de Baffin' (July); 'Le mythe de Sedna chez les Eskimos du centre' (Nov.).

In *L'année Sociologique* (*1904–5*) he collaborated with M. Mauss in an important study on the social morphology of the Eskimo, entitled 'Essai sur les variations saisonnières des Eskimos (pp. 40–132).

To *L'Anthropologie* he contributed a number of reviews (1905–13) on the works of W J McGee, Mauss, Steensby, E. de Jonghe, Nuttall, Speck, Berloni, and others.

In collaboration with Dr. P. Rivet he published several linguistic papers, namely: 1, 'Contribution à l'étude des langues Colorado et Cayapa (Equateur)' (in *Journal de la Société des Américanistes de Paris*, t. IV, 1907); 2, 'La famille linguistique Záparo' (*ibid.*, t. IV, 1908, fasc. 2); 3, 'La langue Jíbaro ou Šiwora' (in *Anthropos*, IV, 1909; V, 1910); 4, 'Affinités des langues indigènes du sud de la Colombie et du nord de l'Equateur' (Paniquita, Coconuco et Barbacoa) (in *Muséon*, 1910); 5, 'La famille Betoya ou Tucano' (in *Mémoires de la Société de Linguistique de Paris*, t. XVII, 1911).

In the *Revue d'Archéologie* (1911) he published a study on the present knowledge of the 'Manuscrits indigènes de l'ancien Mexique,' which he later completed in his article on 'L'Ecriture Maya' (in *Journal de la Société des Américanistes de Paris* (1913)).

In 1911 he collaborated with Mme. M. Hollebecque in the preparation of a small handbook on the origin and nature of religious phenomena, *Les Religions, Etude historique et sociologique du phénomène religieux* (Paris, M. Rivière).

The premature end of his career leaves many important studies

and works unfinished. More than 5000 slips, representing many years of work, had been compiled, prepared, and sorted, and the plan arranged for a voluminous sequel to his *Manuel d'Archéologie Américaine*, entitled *Peuplades Sauvages de l'Amérique*. In collaboration with MM. Lahy, Chaillié, and Mme. Hollebecque, he was also compiling materials for an exhaustive study of the *Mythes de la Création*, in the various parts of the world.

When, in the spring of 1913, he was invited to join the Canadian Arctic Expedition, his decision was instantaneous. We are told by his mother that this "was the first great joy of his life." Fond of seeing things with his own eyes, he wanted to live among the peoples with whom his imagination had dwelt for so long. The fragmentary evidence of books and museums was no longer sufficient; and he had long felt the call of living realities. Some of his La Sorbonne friends, in fact, wished, in 1909, that an expedition might be organized enabling him to complete in the field his Eskimo studies. Fate, however, seemed to be against him, and he many times despaired of ever getting away from libraries, museums, and the exacting trivialities of his Parisian environment. The opportunity of joining the Canadian Arctic Expedition, although practically devoid of any material compensation, appeared to him as a unique chance of emancipation. His mother, to the support and love of whom he had pledged his life, was glad for him, although heart-broken. In a recent letter she wrote: ". . . Life had never yielded him the happiness which he deserved; and I was hoping for his future." When he joined the Anthropological Division of the Geological Survey of Canada, his new friends enjoyed the charm of his companionship and brilliant conversation. Everyone was impressed with the extent and soundness of his science. Jenness, his companion ethnologist, wrote from Nome (Alaska) ". . . Beuchat is an absolute encyclopedia of knowledge. He has already been christened 'professor.' And he is a most delightful companion . . . ." Jenness, an Oxford University graduate, did not seem to suspect that his highly deserved eulogy was addressed to a humble Paris typographer, accountant, secretary, proof-reader, and government employee, who in spite of all burdens

and odds had achieved learning. His friend Chaillié, a French scientist, wrote of him: "His quality of self-made man (*autodidacte*) was what we liked him for. Besides his reading and prodigious memory, he had imbibed much experience in varied stations in life, whence his emotional and intellectual faculties had derived precious gifts . . . ."

But where he was sure to find the realization of his dreams and the enjoyment of a world of actualities, he was unfortunate enough to meet, at the age of thirty-five, the fate of so many polar explorers. All those who knew him mourn today the loss of a friend and Americanist in whom they had placed the most sanguine hopes. When the news of his presumed death was last summer broken to his mother, it was feared that she could not withstand the shock. She showed herself, however, as heroic as many had known her to be and she finally said: "I have lost everything. But I won't give up life yet. Our epoch of gigantic struggles is worth living through." And more recently she wrote: "I feel in my heart that my sorrow would be less bitter if I were told that the loss of my only son has been a sacrifice to science."

ANTHROPOLOGICAL DIVISION,
GEOLOGICAL SURVEY, OTTAWA

BOOK REVIEWS

METHODS AND PRINCIPLES

The Antiquity of Man. Arthur Keith, M.D., LL.D., F.R.S., Hunterian Professor, Royal College of Surgeons of England. Philadelphia: J. B. Lippincott Company, 1915. Pp. xx, 519, 189 illustrations.

On account of the war this work did not appear until one year after the proofs were corrected. In it the problem of man's antiquity is approached from the point of view of the anatomist.

Dr. Keith's initial chapter deals with the Neolithic race that built certain megalithic monuments of Kent. This race is long-headed and short of stature, not very different from a modern group of English people of the industrial class. The most pronounced differences are to be seen in the teeth and the lower limbs. This type characterizes the later Neolithic period in England, and is found in the long barrows. It is a variant of the earliest Neolithic race in England represented by the Trent or Muskham skull, called by Huxley the "river-bed type." It is also found in Spain, France, Switzerland, North Germany, and Scandinavia; likewise in Egypt of the Sixth Dynasty, which is contemporaneous with the Neolithic of England.

According to the author, the early Neolithic period corresponds to the period of the submerged forests. At that time the estuary of the Thames was far out in the North Sea, just west of the Dogger Bank. Since then there has been a filling of the valley due to submergence. At Tilbury below London in 1883 the old Neolithic valley bottom was met with at a depth of 32 feet below the level of the marsh. Some three feet deeper a human skeleton was found. It is supposed to represent the people of the submerged-forest area, and to have been deposited there anywhere from seven to twelve thousand years ago. The Tilbury skull is also of the river-bed type.

From the river-bed type the author passes to a consideration of the later Paleolithic population of Europe, as represented by the remains from Engis, Crô-Magnon, Grotte des Enfants, Brünn, and Combe-Capelle. In his opinion the two Grimaldi individuals from the Grotte des Enfants belong to an aberrant Crô-Magnon form, rather than to a different race. Both are of Aurignacian age. During the later Paleolithic period Europe

was inhabited by tall and rather distinct races having long, narrow heads, and brains that were capable of conceiving and appreciating works of genuine artistic merit.

Going back a step farther, we come to the Mousterian epoch, that of the Neanderthal race, which the author synchronizes with the 50-foot terrace of the Thames valley (known on the Continent as the low terrace). *Homo neandertalensis* was a type quite distinct from the men of Crô-Magnon and Combe-Capelle. Its skeletal remains have been found from Gibraltar in the south to the Neander valley in the north, and from the Island of Jersey to Krapina in Croatia.

Of pre-Mousterian races the author has much to say. Traces of them are found in the 100-foot terrace of the lower Thames valley. The skull found by Mr. W. M. Newton at Dartford is supposed to be of Acheulian age; while the skeleton found in the gravel pit at Galley hill is assigned to the still more remote Chellean epoch. The skeleton recently found under a layer of chalky boulder clay at Ipswich is accepted as authentic, and consequently referred to a pre-Chellean stage, although anatomically it differs little from a Neolithic or even a modern skeleton. That it should be wholly different in type and at the same time be nearly as old as *Homo heidelbergensis* interposes in the mind of Dr. Keith no serious difficulties. Future discoveries may prove him to be right. The more conservative thinkers, however, would not endeavor to anticipate the discoveries.

Much space is rightly reserved for a consideration of the important find recently made at Piltdown Common, Sussex. As a "student of the human body," Dr. Keith is of the opinion that future discoveries will prove that the remains of *Eoanthropus dawsoni* represent the first trace yet found of a Pliocene form of Man, and also that Dr. Smith Woodward is justified in creating for it a new genus of the family Hominidae. In other words, he believes the canine tooth, lower jaw, and skull all belong to the same genus; thus differing from Dr. Gerrit S. Miller of the United States National Museum, who would refer the canine tooth and lower jaw to a fossil chimpanzee, *Pan vetus*, sp. nov.

The author's conclusions are given a final apt and brief expression in the form of a combined anthropoid and human genealogical tree, which is put forth as a working hypothesis. Much of his personality has gone into the pages of this interesting book, which should be widely read.

GEORGE GRANT MACCURDY

The Loom and Spindle, Past, Present and Future. LUTHER HOOPER. (Smithsonian Report for 1914, pp. 629–678.) Washington, 1915.

[Canton Lectures delivered before the Royal Society of Arts, London, Feb. 26, March 4 and 11, 1912. Reprinted by permission from the Journal of the Royal Society of Arts, Sept. 6, 13, 20, 1912.]

In a recent monograph, Mr. Luther Hooper treats in a most interesting manner the development of the modern loom and spinning processes. Starting from the earliest examples, he traces the mechanical evolution in a way that leaves little to be discussed. A portion of this paper was contained in his excellent work entitled *Hand Loom Weaving*, but much new matter has been added. On the primitive forms of textiles, at least their technical problems, there is too little literature. It is rarely indeed that a writer appears possessing the necessary mechanical knowledge, coupled with an interest in the problems of ethnology and archeology.

On page 632 is an illustration of a loom intended to convey rather the essential movements of weaving than to represent any known type. Perhaps the statement that sticks separating the warps are essential to the formation of a workable warp may not be quite exact since some very rudimentary looms exist in which these crosses are absent. But it is certainly true that wherever great numbers of warps are used, such devices are indispensable.

Deviating for the moment from the sequence of Mr. Hooper's article, attention may be drawn to the illustrations of Greek looms on page 636. This loom may be termed the weighted warp type. Besides the places mentioned in the text this class of loom is used among the Chilkat Indians of Alaska. It may be mentioned that the feature of this loom was that it did not allow for the use of the heald rods in the shedding of warps and for this reason could not develop to such a degree as the type about to be considered.

The loom of Calabar illustrated on page 647, fig. 28, is typical of the two-barred heald rod loom which is almost universal. This form of loom, with only minor differences, was used by the natives of Asia and Egypt, and appears in every cotton weaving region except among the Chilkat. Fig. 13, page 641, gives a very clear idea of the purpose of the heald rod. It is, however, a single heald capable only of raising one set of warps. On such a loom the alternate sheds were formed with the aid of the weave sword. Fig. 28, however, has two healds operating alternate sheds and for plain weaving no other shedding devices were required. In weaving with this type of loom it is obvious that one hand

operated the healds while the weft bobbin was inserted with the other. If, however, cords were attached to these healds in such a way as to permit the formation of sheds by a simple pressure of the foot, both hands would be left free for weaving. This would naturally greatly increase the production of the loom. In fig. 29, page 647, the simplest form of such a loom is illustrated. This type of loom is the forerunner of every power loom in our mills today. The great change effected by this simple invention entitles it to consideration as one of the most important in textile history. In the revolutionary effects it produced, it can be compared only with the fly shuttle of Kay, one having as powerful an influence on the management of the warps as the latter on the insertion of weft.

This foot treadle loom was introduced by the Spaniards into Mexico very soon after the Conquest. Perhaps a form such as depicted in fig. 33, page 650, was the one introduced. Apparently the Mexican weavers quickly recognized the improvement in point of output this loom had over their simpler form, and this type of loom unquestionably modified the technique of weaving to a great degree. Mr. Hooper, starting from this simple form, carries the reader easily along through the intricate mechanical additions of the Middle Ages to the culminating achievements of Jacquard and even suggests the future form of the loom. But this part of the paper has a more direct appeal to the textile student than to the ethnologist.

Returning to page 633, a brief description of the essential movements of hand spinning is given. Here again the purpose has been to outline the basic principle rather than describe the craft of any particular people. This is of great value as permitting an observer to comprehend the meaning of the different methods which vary with race, nature of fibers, and other conditions. Plate II is devoted to the spindles of different races. It is unfortunate that descriptive names are not applied to the terms, "whorl" and "spindle." A very cursory examination of the illustration will show that while the object of each is the production of spun thread, yet the difference in form, weight, and position of whorls, indicates that there was a corresponding difference in method. For example, the whorls of Egypt evidently acted as fly wheels and thus exerted a definite spinning function; whereas the band of pottery or copper ball on the Peruvian spindle was simply a device to prevent the completed cop of yarn from slipping. The other object from this latter country is in reality a weaving bobbin and not used in spinning at all.

The early form of spinning wheel shown in fig. 6, page 634, is an

immense mechanical advance over the earlier forms of hand spinning described (an illustration of one example of which is given in fig. 5 on the same page). The transition between these two forms is too abrupt; somewhere in the past there must have been intermediate techniques which would connect these methods.

If what has been said be taken in any sense as criticism, the intention of the reviewer has been defeated. The work is not only excellent, but is in reality the best paper of this nature it has ever been his good fortune to read. Its only fault is its brevity and perhaps its talented author will some day correct even this.

The fallacy of considering hand-loom weaving and machine-weaving as disconnected phenomena is fully exposed in this paper. The immense age of weaving, its continuous practice, even in its simplest forms down to our day, permits the great art to be very carefully studied. There is a great opportunity for the collaboration of the technical expert with the trained ethnologist and archeologist, to their mutual profit. The careful and studious works of Mr. Hooper along these lines are deserving of the highest praise.

M. D. C. CRAWFORD

NORTH AMERICA

The Ammassalik Eskimo. Contributions to the Ethnology of the East Greenland Natives. Edited by WILLIAM THALBITZER. Part I. Copenhagen, 1914.

This is in certain respects a new edition of Vols. IX and X of *Meddelelser om Grønland*, but in English instead of Danish. This feature, with the addition of many new illustrations and the incorporation of later observations, gives us essentially a new work. Three expeditions are reported upon:

(1) The expedition of Captain Gustav Holm, the discoverer of Ammassalik, carried out in 1883–85, (2) Captain G. Amdrup's expedition, entitled *The Carlsberg Fund Expedition to East Greenland*, and (3) W. Thalbitzer's voyage and wintering at Ammassalik in 1905–06, carried out in accordance with the instructions of the Commission for the Direction of the Geological and Geographical Investigations in Greenland, the expenses being defrayed by the Carlsberg Fund.

The Ammassalik Eskimo here designated are a semi-isolated group upon the east coast of Greenland, concerning which we had no very definite data before Captain Holm's return in 1885. Holm's expedition was originally projected to seek the traditional eastern settlement of the

old Scandinavian Northerners. No traces of such were found but Eskimo were encountered who had not for a long time at least been in contact with Europeans. These lived around the many indentations of the east Greenland coast opposite Iceland. Later, the Government established a post among them and the civilization of these interesting Eskimo proceeded rapidly. About 1898 the Amdrup expedition skirted the east coast, getting much farther north than the preceding one. Then in 1905 Dr. Thalbitzer spent a winter at Ammassalik. It is chiefly these last studies that form the weighty and essential parts of the present work.

The ice, climatic, and faunistic conditions at Ammassalik are not very different from those on the southern coast of Greenland. There is considerable driftwood and since the establishment of the government station a number of European articles have been picked up on the beach, suggesting the former possibility of some culture infusion. The total population of all settlements in 1884 was 413 (females 220). Among the culture traits of special interest are the peculiar long houses of turf and stone. These are one unit in width but may be as long as the number of families requires. A house fully described in the text contained places for eight families and housed thirty-eight persons. A settlement consists of a single house, as above, which has its effect upon the social organization. For each house there is a head man, or chief. At the initial visit Holm found iron knives in use exclusively, though the use of stone was remembered. Fire seems to have been produced by the strap drill only. Considerable vegetable food was eaten, some being stored for winter use. A good concrete discussion of the confession as used in the cure of disease is given by Holm. Highly developed wooden maps were in use indicating the place to camp, etc., and the native detailed knowledge of the coast was definite. A drum dance was used to settle disputes, the idea being to see who could ridicule the others down. As among other Eskimo, families often starved in winter and in consequence enforced cannibalism was not unknown. Suicide was rather frequent.

Among the physical characters of the East Greenlanders enumerated in the text we note that stature increases from south to north. In general the stock is purely Eskimo and surpasses in physical development the native population of West Greenland. Also, the linguistics of the east is widely divergent from the west.

The most important and culminating parts of the volume are Thalbitzer's discussions of the distributions for certain traits. For example, there is an excellent exposition of house types and their distribution. Three distinct types are found, a round whale bone house, a rectangular

and a pear-shaped house. The circular shape of the former is believed to be due to the materials alone. All three types occur among the East Greenlanders. A similar discussion of boats is deserving of notice. While the sail is used in West Greenland, it was not found in the east. The umiak was used at Ammassalik but it was not in use to the north. The same is true of kayaks. The harpoon is also considered; the "feathered" butt of the west is found in the east, also the knob. Space will not permit further enumeration. The sealing stool used in the east is like those of the Western Eskimo and not like those of West Greenland. One peculiarity of the East Eskimo is the absence of fish hooks.

The evidences for the use of iron on the east coast give rise to a critical examination of Solberg's theories as to the use of iron before the Norse period, our author tending to reject the view. The east shore people, at least, had only such iron as came to them in wreckage. A close study of stone tools, however, shows clearly that originally a stone age prevailed in the east and that the later iron tools of native make are of recent origin and tend to follow the old stone models.

Two very interesting objects are eye shades and sinew-twisters; both occur in East Greenland and Alaska, with no definite traces between.

At the end of the volume is a very full comparative discussion of the preceding data, leading to the conclusion that the East Greenlanders came both from the north and the south because in their culture are both distinctly West Greenland traits and those not found there but farther west. The northern migration is assumed to have followed the north shore of Greenland from the vicinity of Smith sound. In a more general discussion Thalbitzer supports the view that the Eskimo were dispersed from the Bering sea area and not from the vicinity of Hudson bay. However this may turn out, it is fairly clear that the original population of Greenland came from the northwest, one branch of which passed around the north coast and thence down the east side to Ammassalik, the other crossed at Ita and spread down the west coast. The latter managed at one time to reach Ammassalik from the south where the two cultures are fused. The author considers the first peopling of Greenland to have occurred not much earlier than 1000 A.D.

In closing this very inadequate summary it is not too much to say that in this work we have a masterpiece in the anthropology of the Eskimo and one that offers a fair substitute for a much needed general treatise upon Eskimo culture.

CLARK WISSLER

The Glenoid Fossa in the Skull of the Eskimo. F. H. S. KNOWLES. (Canada Geolog. Survey Mus. Bull. No. 9, anthrop. series No. 4, pp. 1–25 incl. four plates.) Ottawa, 1915.

The pronounced shallowness of the glenoid fossae in Eskimo skulls was the object of the author's comprehensive investigations. The fossa glenoidalis is divided into two parts by the Glaserian fissure. Serving for the articulation of the condyle of the lower jaw, the anterior portion of the fossa is the one taken under specific observation. It is bounded in front by the eminentia articularis, and is concave and smooth. The means of working the lower jaw against the upper in the act of mastication or triturating the food, upward, forward, and sideways in rotary motion, are principally the Mm. temporalis, masseter, and pterygoideus externus. These muscles are very strongly developed, as are the skeletal parts where they originate or insert. Besides being characteristics of a primitive type in general, these special features are of functionary origin. They are due to triturating a very tough and primitively prepared diet of a more or less purely animal nature, such as fish, flesh, fowl, raw whale skin (matak), etc. "An Eskimo's jaws are essentially of a biting and chewing type"—to explain this the author has recourse to the evidences furnished by comparative anatomy—and the extraordinary efforts employed to overcome the resistance of their food by a strongly side-to-side movement which also produces the peculiar attrition of the teeth, are responsible for the peculiar shape of the glenoid fossae. Their shallow form "is due most largely to the rolling and flattening out of the eminentia articularis, as well as perhaps to a relatively lesser depth of fossa." This state is different in civilized races, where the fossae are deeper. Their diet is of a softer kind favoring the diminution of the side-to-side movement. Instead of the incisors in the lower jaw being in apposition to those in the upper one, the overlapping bite has developed a tendency to narrowing of the palate. A table of diagrams and a number of photographic reproductions serve to illustrate the conditions described.

BRUNO OETTEKING

Indian Habitations in Sussex County, New Jersey. MAX SCHRABISCH. *Indian Remains near Plainfield, Union Co., and along the Lower Delaware Valley.* LESLIE SPIER. (Bulletin 13, Geological Survey of New Jersey.)

Under the foregoing awkward double title the Geological Survey of New Jersey has put forth its second publication on the results of its preliminary archeological work.

The opening part of Mr. Schrabisch's treatise concerns the general archeology and physiography of Sussex Co. and is well handled, as are his introductory remarks on rock-shelters and cemeteries. Two types of burial hitherto unreported from this locality are recorded. One form is a cairn tomb, masses of rocks being heaped over the grave, and the other consisted of walling of the corpse in a small case. Neither variety was of common occurrence.

The section on trails, while probably essentially correct is rather too speculative to be of real value, but the part devoted to raw material is good. Besides the ordinary local stone, hematite, obsidian, and chalcedony are noted. The obsidian, at least, is presumably of distant origin.

Under the heading "Description and Location of Sites," Mr. Schrabisch enumerates his localities with interesting notes. His unfamiliarity with the accepted nomenclature of archeology, however, sometimes make his observations confusing. For example, in describing some shell pendants in the shape of birds found on the mainland near Minisink island (p. 29) on the upper Delaware, he refers to them as "bannerstones," a misapplication of the name of a well-known object. A wretched cut made from a field sketch accompanies the description.

In referring to chipped implements the author frequently calls them "beautifully carved" (vide pp. 33, 42) whereas he means shaped. On page 54 there is noted the discovery of a "double pointed fishhook." This is extremely interesting, since all types of fishhooks are rare hereabouts, and no "double pointed fishhook," whatever that may be, has ever been reported; yet no description or figure is vouchsafed us.

In marking the map Mr. Schrabisch has not used his symbols in the same manner as Mr. Spier. The symbol for "scattered relics"—sporadic occurrences of random implements—never occurs. Each place where traces were found is at least a "camp," hence sparsely settled localities over which Schrabisch has wandered and taken notes are apt to be unduly emphasized on the map. The temporary camping grounds in northern New Jersey thus assume a value equal to that of the densely populated Indian villages near Trenton or on Cohansey creek.

The intensive work done by Mr. Schrabisch on rock-shelters is very interesting yet unsatisfactory. Mr. Schrabisch repeatedly (see pp. 38, 40, 43, 53, etc.) refers to stratified relic-bearing layers, but gives no data or measurements. The reviewer knows of exactly two stratified shelters besides those mentioned in the paper under consideration,—one found at Armonk in Westchester County, New York, by M. R. Harrington,[1] the

[1] See *Anthropological Papers of the American Museum of Natural History*, Vol. III, p. 126.

other near Ardsley in the same county, explored by the Rev. Wm. R. Blackie and Leslie Spier. In the latter case the stratification was of recent origin due to burning brush and refuse; in the former great antiquity, though probable, need not be assumed.

Mr. Schrabisch repeatedly avers that pottery occurred only near the surface in his shelters, yet his own specific data contradict his general statements. For example, on p. 43, concerning the Gun Hollow shelter, he states:

> About a thousand pieces of pottery were scattered through all the layers, though somewhat more frequently near the top, etc. . . .

On page 55 he says of Moody's Rock-shelter:—

> The potsherds occurred in the upper strata only perhaps indicating a late introduction of the art of pottery making, but perhaps indicating that at first the shelter was visited only by hunters and later by families. . . . In the process were turned up at a depth of 3 to 30 inches. . . . Again, on reaching the bottom, the crevices between the boulders showed a dirt floor farther down.

This second floor was *not* examined, for on p. 54 we read:—

> At the bottom tightly wedged boulders were found, beneath which, at a depth of 18 inches, another dirt floor was plainly visible, so that another and more ancient culture-bearing stratum may occur below. This hypothesis could not, however, be tested without the expenditure of much time and the labor of several men.

The theory of the late introduction of pottery as shown by the rock-shelters still stands as it did before the work was done,—probable, but unproven. Mr. Schrabisch or some other student should in the future take pains to give us a few accurate, laboriously taken accounts of shelters in which the delimiting measurements etc., are carefully taken.

The second portion of this book, by Mr. Spier, is eminently satisfactory as far as it goes. Mr. Spier apparently devoted his time to locating sites and did no intensive work, so that the results of his operations cannot fairly be compared with the work of Schrabisch, who apparently had a free hand.

ALANSON SKINNER

Social Life and Ceremonial Bundles of the Menomini Indians. ALANSON SKINNER. (Anthropological Papers of the American Museum of Natural History, vol. XIII, part I, 1913.)

The interesting contents of this volume form the first part of the ethnological material collected by the author during four summers' field-

work among the Menomini Indians. The second part will be published in another volume, treating of the cults and ceremonies, the folklore and mythology, while the data on material culture will be reserved for a future comparative study of the Central Algonkin group.

The author's informants in addition to his chief assistant, Mr. John V. Satterlee, U. S. Government interpreter and chief of Indian police at Keshena, were a number of Indians, nineteen of whom are mentioned; but regarding the way in which the information was obtained (whether directly from those Indians, Mr. Satterlee acting as interpreter, or mainly from Mr. Satterlee himself, his communications being supplemented or corrected, by the others) the reader is less fully informed. Of course, we do not mean that the author should have given a detailed account of the share of each informant, but that he might have informed us of his working method in a general way. The classification of the subject-matter is entirely in keeping with the title. The second and larger part of the book deals with "Cosmology and Medicine Bundles," while in the first ten chapters the following subjects are discussed successively: Home life of the Menomini; Social organization; Marriage customs; Terms of relationship; Children, birth and naming customs; Games; Months and seasons; Burial customs.

It may, of course, be objected that this classification does not always bring out the connection between some subdivisions (thus all that relates to war and hunting belongs as much to the social as to the religious life, and some chapters of the first part contain much that might just as well be mentioned under "Cosmology"), but on the other hand it facilitates the survey, and is at any rate to be preferred to every attempt at preserving the natural connection at any cost.

Though, in our opinion, the author sometimes goes rather too far in his striving after succinctness, and some further explanation concerning certain points would by no means have been superfluous, yet on the whole his descriptions and communications leave nothing to be desired in the way of clearness. In what follows I shall not try to give a brief summary of the contents of each chapter, but shall mention only what seems most important. It would, indeed, hardly be possible to compress the matter within a smaller space than the author himself has used.

The aversion to telling myths during summer, for fear of the "horrid old toad" (p. 5) I also found among the Ojibwa of Red Lake; this even caused me much delay in my work. In Red Lake that same toad (or frog) serves as a kind of bugbear with which they threaten naughty children, especially not very young girls, in which case the threat has a more or less obscene character.

The well-known ease with which an Indian breaks his promises is explained by the author as arising from exaggerated respect for the rights of the individual. I perfectly agree with this explanation, but undoubtedly it often happens that in making his promise, he already intends not to keep it; this is, for the Indian feeling, less shocking than a flat refusal. When we read (p. 7): "It [the Menomini moral standard, judged from our point of view] is far higher than that of the Ojibway or Cree. . ." we would ask whether this statement is based on information given by Menomini Indians or on experiences of the author himself.

There are ten exogamic gentes, each of which embraces several subgentes. The leading subgens descends from the animal ancestor and, like the whole gens, bears his name. The principal, "royal," gens descends from the first Menomini, "the great bear." Formerly each gens had some special masculine and feminine proper names, none of which was ever allowed to be in desuetude. With the aid of an eighty-four-year old Menomini the author has succeeded in drawing up a complete, or nearly complete, list of all gentes, subgentes and gentile names. When Hoffman was working among the Menomini, the ancient system was already in a state of decay, and at present the exogamic rule too is no longer followed.

A person is in "joking-relationship" with his uncles and aunts, nephews and nieces, sisters-in-law and brothers-in-law on either side. The joking-relationship also implies the lawfulness of sexual intercourse. Very near is the relationship with nephews, nieces, brothers-in-law and sisters-in-law. Besides the mother-in-law taboo the father-in-law taboo is observed to a certain extent, but for the latter there is no fixed rule.

Civil authority is vested in the head chief, whose office is hereditary in the royal family of the royal gens. In his function of chief of the police he was assisted by the sacred war-bundle holders (by whom, by the way, were performed all military functions) and by all men of acknowledged bravery. One of these warrior police had charge of the peace pipe and played an important part in settling disputes, especially in murder cases. Retaliation was usually bought off with presents. The rice harvest, too, was regulated by the police.

The chapter on Government is followed by some useful comparative notes.

In general, marriage is a matter that concerns the parents more than the marriageable children themselves. The parents of the young man choose a girl, ask her from her parents, and the latter receive presents, which practically ends the matter. Both divorce and separation occurred

frequently. Adultery on the woman's side was punished in the well-known manner.

Before the birth of the child both father and mother abstain from certain kinds of food. Whether this custom is really to be considered as a "mild form of the couvade" (p. 35, note 2) is still doubtful (cf. Kunike, *Zeitschrift für Ethnologie*, 1911, p. 346 ff.). Sometimes the child receives its name from the parents, but if there is evidence of its being under the special protection of the powers above (a boy under that of the "thunderers," a girl under that of the "sky-sisters"), it is considered to have already a name and so this has to be found out. In doing this they often want the help of an old seer who understands the language of babies. In profane cases, too, such a person has often to lend his aid (likewise among the Ojibwa of Red Lake, cf. *Baessler-Archiv*, Beiheft V, p. 20). Such children lie under certain obligations towards their supernatural protectors; so, for instance, they have to play, at least once a year, a sacred game (lacrosse for the thunderers and shinney or dice game for the sky-sisters); and on the other hand, they have to be treated with special consideration lest they should get tired of their earthly existence. Besides their real name they have a so-called "lucky name," which is used only in the family circle, but which sometimes supplants the other. These "lucky names" consist in a certain number of fixed appellations for the eldest son, the eldest daughter, the eldest son but one, etc. So the eldest son, if he is a "thunder child" is often called "brother to the thunderers."

The dream fasting of youths and maidens lasts eight or ten days. Unfavorable dreams (in general all dreams bearing no relation to the powers above) are made no account of unless they have returned for the third time after a fast interrupted and afterwards resumed. Great importance is attached to these dreams and they influence a person's whole life. One may dream of four sets of "strong powers": the gods above, the gods below, the manitou animals, the sacred metal cylinder. The last named is supposed to be in the center of heaven. To common night-dreams, too, great importance is attached. A number of puberty-dreams have been noted down by the author. The menstrual customs among the Menomini do not deviate from the general type; only it is remarkable that if a menstruating woman should, contrary to rule, enter a house in which there are sacred objects, this can do no harm.

Nearly every game has a two-fold meaning: recreation and religious act. The following are described successively: Ball game, land or earth game (resembling the white man's "prisoner's base"), flying stick game,

snow snake, ice game, lacrosse, shinney, bowl and dice game, cup and pin game, moccasin game, cat's cradle, draw stick game, racing.

The Menomini reckoned by winters. The lunar year was divided into five seasons: winter, spring, summer, autumn, Indian summer. There are twelve lunar months (perhaps European) and six directions (up and down being counted among them.)

Most burial and mourning customs that are or were in use among the Menomini are also found among the related tribes, or at least unrelated neighbors. A mythical explanation concerning the "death bundle" (a very queer one though) is to be found in my Ojibwa texts (cf. *Baessler-Archiv*, Beiheft V, p. 6). I do not know if among other Ojibwa or related tribes the origin of this well-known custom is also connected with that particular episode from the trickster myth.

The general concepts of the universe of the Menomini deviate little from those of the neighboring tribes. However, among them the whole complex has more of the character of a religious system than is the case among the other tribes. As the basic principle of their religion the author considers "the struggling between two opposing forces: the good and the bad." This does not mean much, seeing that the same thing might be said of every form of religion without fear of contradiction. What the author really means, and what he, indeed, demonstrates further on, is that this struggle is very distinctly expressed in contrasting the powers above (good) with the powers below (bad). The universe above the earth is divided into four strata. In the topmost stratum dwells the supreme God, creator of the universe: Mätc Häwätûk, whom the author —rightly, I think,—supposes to be originally identical with the sun, which seems to be borne out by his relation to the thunderbirds, his servants, who dwell in the following stratum. It seems, however, doubtful whether he should also be identified with the "essence of good" as the author thinks. But also to us it seems to be beyond doubt that he owes to missionary influences his modern character, coming very near the Christian conception of the Deity. In the third and fourth divisions of the upper world, respectively, dwell the sacred swan and the golden eagles, and the other birds, which are all servants of the thunderbirds. The chief of the underworld is the white bear, which according to the author personifies the essence of evil. He resides in the lowest stratum of the underworld and has a named bear as a servant. In the following division dwells the panther with his servant, the white beaver, and to the two upper divisions belong respectively the white deer (with the black cat) and the horned snake (with the dog). Especially the horned snakes

mostly called mīsikinū'bikuk, are very well known, and play an important part in folklore. It is an interesting circumstance that tobacco is offered to the underworld powers as well as to the thunderbirds. Besides the regular powers there are in the sky and on the earth a host of strange, non-human beings that are malevolently disposed towards man in general and whose destruction is the unceasing care of the culture-hero, Mä'näbus. The Menomini version of the journey of the souls of the dead to the hereafter (westward toward the home of Mä'näbus) shows no features unknown elsewhere.

The medicine bundles are to be divided into four groups: war bundle, hunting bundle, witch bundle, and good luck bundle. As to their origin the author advocates the theory that they are the gradual outgrowth, by accretion, of different separate charms. That this process really takes place may be considered as proved, but this does not prove that all the bundles always originate or have originated in this way. The whole bundles, as well as the medicines they contain are, as to their power, by no means personal. They may be transferred from one person to another without losing all of their power. This power results from three different qualities of the object: the power it has through contact with the beings who gave it; the power resulting from the dream with which it is connected; and the power of the songs belonging to it. If one does not know the songs one cannot do anything with the medicine. The bundles of the Menomini differ from those of several other tribes in this, that in being transferred from one person to another, their full power is not preserved. Most bundles are believed not to have come directly from the gods who made them, but to have been acquired through the intercession of lower powers. The war bundle was given by the thunderers, and the way in which this donation took place is told at length. Besides the medicines proper the thunderers also gave all kinds of regulations concerning war and the ceremonies connected with it. The most important of these are the semi-annual offerings (in spring and in autumn), when the voices of the thunderers are first heard, and the war ceremonies properly so-called: the war dance (before the fight) and the scalp dance (after it). He who had taken a scalp had to lick the fresh blood from it, and ceremonial cannibalism also frequently occurred, as the author tells us, "from pure bravado." There is no arbitrary limit to the number of war bundles in the tribe; any one who is urged to do so by a dream may make and use one. Formerly the songs belonged to the bundle as a whole. The American Museum of Natural History possesses eight war bundles, of which the author gives an illustrated description. His communications

concerning war customs are highly important, and their value is considerably enhanced by the songs noted down in Menomini. That the author has not or only partly normalized his spelling is sure to meet with approval.

Besides all kinds of small private medicines, the Menomini also use medicine bundles in hunting as well as in war. The principal of these are said to have been given to man by the gods through the medium of Mä'näbus and his brother. These are the "public bundles," and the use of them is connected with repeated important ceremonies. The most important, called Misasakiwis, which the author discusses at length, can be possessed only by some special individuals. Women are not only forbidden to possess it but even to touch it. The two other public bundles, which are of the same character, are to be considered, according to the author, as an offshoot of the first.

The private medicine bundles were acquired in different ways. With one of them is connected a myth which, as the author observes, resembles more the mythical traditions told among the Plains tribes in connection with medicines. This myth, namely, tells of a little girl that had been put outside the lodge by her mother, with the threat that the owls would come and fetch her away. She was really taken away by an owl, and later she was brought back to her home with a medicine that the owl had given her. Such private medicine bundles form indeed a transitional class between the public and the private medicines in a narrower sense.

Just as among most other Woodland tribes there are found among the Menomini small wooden images, made by the owner as the result of instructions in dreams. They represent the "God of good luck," and every possible blessing is expected from them. So they play the same part as the "good luck bundle," which is considered as a gift from the powers below.

Before concluding his review—which could, of course, hardly be more than a brief survey—the present writer would like to make a single observation of a more general character. It is easy to understand that the field-worker who has proper informants at his disposal, will do whatever he can to get informed as fully and thoroughly as possible concerning the subject he is studying. And, considered from this point of view, he is not to be blamed if he prefers a rich material in English to the results, much scantier as to quantity, which would have been yielded in the same space of time by the recording of texts. However, the present writer is convinced that the field-worker is justified in choosing

the first-named way of proceeding only if he thinks himself unfit for the other—certainly much more difficult—way, either in consequence of inadequate preparation or from some other cause. This not being the case with the author of the book just noticed, as appears from the many songs, we hope that he will in due time give us a collection of texts in some Central Algonkian dialect, recorded with the same painstaking care as the results published in this book, of his researches among the Menomini.

J. P. B. DE JOSSELIN DE JONG

The Fighting Cheyennes. GEORGE BIRD GRINNELL. Charles Scribner's Sons: New York, 1915.

At the outset the author states, "This book deals with the wars of the Cheyennes." And while this self-limitation is faithfully adhered to throughout, there does nevertheless creep in considerable discussion of other culture traits. Mr. Grinnell has always shown a deep personal feeling for the Indian of the Plains, in contrast to the mere professional attitude of many anthropologists. This is particularly true in the present work. The general plan of the book is to have the Indians tell their own stories in their own ways. Thus,

> Since the Indians could not write, the history of their wars has been set down by their enemies, and the story has been told always from the hostile point of view. White writers have lauded white courage and claimed white successes. If it has been necessary to confess defeat, they have abused those who overcame them, as the defeated always abuse the victors.
>
> Evidently there is another side to this history, and this other side is one which should be recorded; and, since the wars are now distant in time, the Indians' own descriptions of these battles may be read without much prejudice. I have tried to present the accounts by whites and Indians, without comment (pp. V–VI).

The high personal regard the author holds toward the narrators is indicated by the statement that "The old time Cheyennes possessed in high degree the savage virtues of honesty, trustworthiness, and bravery in the men, and of courage, devotion, and chastity in the women" (p. VI).

The book consists of thirty-one chapters, which in the main cover the period from 1830 to 1890, when the military activities of the Cheyenne may be said to have become a thing of the past. The earliest definite date set by the author is 1830 as the year in which the Pawnee captured the famous sacred arrows of the Cheyenne. Though no evidence for the correctness of this date is cited we assume that such exists. Before 1830 all is considered vague, but 1820 is taken as the probable date for certain

adventures with the Crow and 1817 as an uncertain date for a raid upon the Shoshoni. The definite engagements described include those with other Indians (Kiowa, Pawnee, Potawatomi, Sauk and Fox) and those with the United States troops (Sand Creek, Powder River, Ft. Phil Kearney, Hancock's campaign, Beecher Island, Crook's fight on the Rosebud, Capture of Dull Knife, the Lame Deer fight, etc.). To these should be added another contribution to the history of Custer's misfortune. It is thus clear that a very large part of the 431 pages recounts engagements between the Cheyenne and United States troops. While the author does not offer to comment upon the actual fighting, he energetically defends the Indian's cause by bringing forward data to show that he was in almost every instance forced to fight against his will.

While there are here and there parenthetical remarks by the author on Cheyenne traits, the first two chapters at least will interest the anthropologist.

The arrival of the Cheyenne at the Missouri is placed at 1676, they having been driven southwest by the Assiniboin. We should like to hear some discussion of this date because there is now quite a literature upon the assumed migration of the Cheyenne. It is regrettable that the author did not choose to give some notice to these references. Especially so since my colleague, Dr. Spinden, has found a Spanish reference to the name under date of 1695. De Vargas writes:—

> While I was absent from this city there arrived a band of Apaches from the east, who are called Chiyenes, and they told in the town at which they arrived which is of the Picuriés tribe, how some men, white and light-haired, had destroyed a very large tribe of the Apaches Conejeros, living much further inland than their own. The Chiyenes then returned whence they came.[1]

Remembering that at that period Apache was a general term for non-Pueblo tribes, we have something demanding further investigation. While the Cheyenne could have drifted down in a few years, how came De Vargas by the name? But to return to our subject, we are told that they lived for a long time near the earth-lodge dwellers of the Upper Missouri and took over some of their traits, but later on became true Plains people. The Cheyenne first met the Kiowa above the Black Hills on the Little Missouri River, ranging between the Crow and the Arikara. The Comanche were also in the same vicinity. The author apparently accepts the Cheyenne statement that they drove all these people out, the Crow northwestward, the Kiowa and Comanche southward, assisted

[1] Ralph Emerson Twitchell, *The Spanish Archives of New Mexico*, 1914, Vol. I, p. 265.

to some extent by the Arapaho. All this is stated as a matter of course but we can be sure the serious reader will want some corroborative evidence. Unfortunately, it is not altogether clear that the author as the Indian's spokesman arrived at all these data independently, though this is implied. If he did, we should have a good test case for the evaluation of historic tribal traditions. However, in this connection we find a case where what is given as a Cheyenne war narrative is but the variant of a widely distributed war tale. Thus it is claimed that a Cheyenne woman was once alone skimming fat by the light of a torch fastened over her head and routed an Assiniboin war party by whirling a piece of hot backfat. This tale is found among a number of northern tribes; hence, that it was really a Cheyenne exploit is doubtful. The facts of distribution at once discount its value as tribal historical tradition and raise a proper suspicion as to the historical accuracy of all such narratives.

There is also a chapter on the "Ways of Warriors" in which the personal narratives of three individuals are given as types.

All in all this book is a worthy production and is one of the most complete collections of tribal traditional war narratives that has come to our knowledge. In all native accounts of this kind there is certain to be much miscellaneous information of great importance to comparative studies, the only difficulty being to find it. While the book has a good index, the conventional form of an index is certain to miss many of these, for their significance will not appear to the casual reader. The comparative student of Plains culture must go through the pages for himself and to such this volume is recommended.

CLARK WISSLER

SOME NEW PUBLICATIONS

Ankermann, Bernhard. Verbreitung und Formen des Totemismus in Afrika. (Zeitschrift für Ethnologie, 1915, Heft II u. III, pp. 114–180, with chart.)

Balch, Herbert E. Wookey Hole, its Caves and Cave Dwellers. With an Introduction by Professor Boyd Dawkins; Period Restorations and numerous Drawings by John Hassall, R. I.; Cave Photographs and Diagrams by I. H. Savory. Humphrey Milford, Oxford University Press, 1914, XIV+268 pp.

Barbeau, C. M. Huron and Wyandot Mythology. With an Appendix containing earlier published records (Canada Dept. of Mines, Geological Survey, Memoir 80; No. 11, Anthropological Series.) Ottawa, 1915. Pp. 437, of which 417–437 are plates.

Boas, Franz. Publicaciones de la Escuela Internacional de Arqueología y Etnologia Americanas, 1911–1912. Album de Colleciones arqueologicas. Ilustraciones por Adolfo Best. Pls. 69. Müller Hermanos: Mexico, Ave. San Francisco 28.

Byington, Cyrus. A Dictionary of the Choctaw Language. Edited by John R. Swanton and Henry S. Halbert. (Bureau of American Ethnology, Bulletin 46.) Washington, 1915. P. 611.

Claridge, W. Walton. A History of the Gold Coast and Ashanti. From the Earliest Times to the Commencement of the Twentieth Century. With an Introduction by Sir Hugh Clifford, K. C. M. G. London: John Murray, 1915. 2 vols.; pp. XXXIII, 649; XV, 638; 7 maps.

Gehrts, Miss M. A Camera Actress in the Wilds of Togoland. J. B. Lippincott Co.: Philadelphia, 1915. XX, 316 pp.; 40 ills., 1 map.

Heye, George G. and Pepper, George H. Exploration of a Munsee Cemetery near Montague, New Jersey. (Contributions from the Museum of the American Indian. Heye Foundation, Vol. II, No. 1.) Pp. 78, 1 map, 34 pls., 22 figs. New York: Museum of the American Indian. Heye Foundation, 1915.

Jastrow, Morris, Jr. The Civilization of Babylonia and Assyria. J. B. Lippincott Co.: Philadelphia, 1915. 8°, 1 map, 164 ills. (Price $6.00 net.)

Morley, Sylvanus Griswold. An Introduction to the Study of the Maya Hieroglyphs. (Bureau of American Ethnology, Bulletin 57.) Washington: Government Printing Office, 1915. Pp. XVI, 284; 17 tables, 32 pls., 85 figs.

Raphal, John R. Through Unknown Nigeria. London: T. Werner Laurie, Ltd., no date. Pp. XIX, 361; 61 ills.

Skinner, Alanson and Satterlee, John V. Folklore of the Menomini Indians (Anthropological Papers of the American Museum of Natural History, vol. XIII, pt. III) New York, 1915. Pp. 217–546 (Price, $1.60).

Parkyn, Ernest A. An Introduction to the Study of Prehistoric Art. Longmans, Green & Co., London, 1915. Pp. XVIII, 349; 16 pls.; 318 figs.

Tafel, Albert. Meine Tibetreise. Eine Studienfahrt durch das nordwestliche China u. durch die innere Mongolei in das östliche Tibet. Union Deutsche Verlagsgesellschaft, Stuttgart-Berlin-Leipzig, 1914. 2 vols., XI, 352 pp., 20 figs., 79 pls., 1 colored plate, 346 pp., 16 figs., 75 pls., map.

Weeks, John H. Among the Primitive Bakongo. J. B. Lippincott Co.: Philadelphia, 1914. XVI, 318 pp., 40 ills.

ANTHROPOLOGY AT THE WASHINGTON MEETING WITH PROCEEDINGS OF THE AMERICAN ANTHROPOLOGICAL ASSOCIATION FOR 1915

By GEORGE GRANT MacCURDY

The annual meeting of the American Anthropological Association was held December 27–31, 1915, at the United States National Museum, Washington, D. C., its scientific sessions being in affiliation with Section I of the Second Pan-American Scientific Congress, the Nineteenth International Congress of Americanists, the American Folk-Lore Society, the American Historical Association, and the Archaeological Institute of America. By virtue of this affiliation the attendance was large and the list of papers presented bearing on anthropology unusually long.

In honor of the occasion, the United States National Museum made provision for special exhibits. These included: (1) Physical Anthropology, by Dr. A. Hrdlička; (2) Indian Treaties of Historical Importance; (3) Economic Plants and Plant Products, by W. E. Safford; (4) Archeological Exhibits, by W. K. Moorehead, A. V. Kidder, and Julio Tello; and (5) Photographs, by Frederick Monsen and the Rodman Wanamaker Expedition.

Interwoven with the scientific sessions there was an elaborate social program, comprising a reception by the Secretary of State and the United States Delegation, and one by the Governing Board of the Pan-American Union, both held in the Pan-American Building; a reception by the Regents of the Smithsonian Institution; a luncheon by the National Geographic Society; a reception by the Trustees of the Carnegie Institution of Washington; a dinner and reception by the Cosmos Club; and finally after the close of the meetings, the reception at the White House by the President and Mrs. Woodrow Wilson.

Report of the Secretary

The Proceedings of the last annual meeting of the Association were published in the *American Anthropologist* for April–June, 1915. The selection of the place for holding the present meeting was left to the Executive Committee, which met at the American Museum of Natural History, New York, on February 20, 1915, and voted to hold the meeting

in Washington, D. C., in affiliation with the scientific bodies noted above; with the proviso that the program for the joint meeting be prepared in Washington and printed without expense to this Association.

A special meeting of the Association was held at Berkeley, California, August 3–5, 1915, the Secretary being in attendance. A report of this meeting was published in *Science* of October 15, 1915. A number of interesting papers were read, but no attempt was made to hold business meetings of the Council or of the Executive Committee. Chairman Waterman however did appoint a committee consisting of Drs. Sapir and Lowie, who were to formulate a protest against the discontinuance of anthropological research in the Philippines. The thanks of the Association are due to the University of California and the Panama-Pacific International Exposition for facilities offered, also to Professor T. T. Waterman, Acting Chairman of the Local Committee.

On December 4, the closing day of the Panama-Pacific International Exposition, an International Toast prepared by President Woodrow Wilson and typifying all that for which the Exposition has stood sponsor was the chief feature. President Chas. C. Moore of the Exposition having requested that our Association join in the closing day exercises by contributing a brief sentiment, the Secretary sent the following:

"In all ages contacts of peoples has been the chief contributing factor in the evolution and diffusion of civilization. As long as there was no way of bringing distant parts of the earth near, progress was slow. By immeasurably shortening trade and travel routes, the Panama Canal has therefore removed a mighty obstacle to world progress. By causing all nations to assemble at one time and place, an international exposition likewise contributes in its way largely to the same result. The Panama-Pacific International Exposition thus aptly symbolizes the quintessence of twentieth century civilization."

The Association has suffered a great loss in the death of Professor Frederic Ward Putnam, which took place in Cambridge on August 14, 1915. Professor Putnam was the last of the three founders of modern anthropology in America, the other two being Brinton and Powell. The only other loss thus far reported is that of Dr. W. L. Marsden, who died at Whittier, California, March 1, 1915.

Applications for membership,[1] 31 in number, are herewith submitted for election as follows: Edithe F. Ashmore, John F. Baer, H. E. Barnes, Oric Bates, R. M. Binder, Rev. John M. Cooper, G. H. Danton, P. L. Faye, Leo J. Frachtenberg, F. W. Fuller, H. K. Haeberlin, Mrs. H. H. S.

[1] Full addresses are given in the list of members printed elsewhere in this issue.

Handy, E. W. Hawkes, A. M. Hocart, Neil M. Judd, Ralph Linton, S. K. Lothrop, Mrs. S. K. Lothrop, J. H. McGregor, B. W. Merwin, R. E. Merwin, Luis Montané, J. R. Murie, L. Parker, C. W. M. Poynter, W. H. R. Rivers, F. Schleiter, Beatrice L. Stevenson, L. A. Stone, J. C. Thompson, C. C. Uhlenbeck.

During the year President Hodge has appointed delegates to represent the Association as follows: To the National Conference on Race Betterment, San Francisco, August 5–8, George Grant MacCurdy; the Nineteenth International Congress of Americanists, Washington, D. C., December 27–31, Franz Boas and George Grant MacCurdy; the Second Pan-American Scientific Congress, Washington, D. C., December 27, 1915 to January 8, 1916, Clark Wissler and Charles Peabody.

Report of the Acting Treasurer

At the meeting of the Executive Committee of the Association held in New York, February 20, 1915, on request of Mr. B. T. B. Hyde, Treasurer, the Secretary was appointed to serve as Acting Treasurer for the remainder of the year.

Report of the Acting Treasurer

Receipts and Disbursements, March 1, 1915, to December 31, 1915

Receipts

Balance from the Treasurer, B. T. B. Hyde		$ 262.38
Anthropological Society of Washington:		
Amer. Anthropologist, Vol. XV, No. 4		
Amer. Anthropologist, Vol. XVI, Nos. 1–4		
Amer. Anthropologist, Vol. XVII, No. 1	$303.04	
Amer. Anthropologist, Vol. XVII, Nos. 2–3	91.08	
Less amount still unpaid	191.08	203.04
American Ethnological Society:		
Amer. Anthropologist, Vol. XV, No. 4		
Amer. Anthropologist, Vol. XVI, Nos. 1–4	262.50	
Amer. Anthropologist, Vol. XVII, Nos. 1–3	188.67	451.17
Annual Dues		1,089.47
Annual Subscriptions to *Amer. Anthropologist*		437.62
Sale of back numbers, including Vol. II, No. 6, *Mem.*		42.68
Authors' reprints at cost		85.89
Miscellaneous		10.95
Total Receipts		$2,583.20

Expenditures

Printing, Binding, and Mailing *American Anthropologist:*			
Vol. XVI and Vol. XVII, No. 1	$1,733.89		
Vol. XVII, No. 2	494.50		
Vol. XVII, No. 3	488.09		
Printing *Memoirs*, Vol. II, No. 6	131.12		
	$2,847.60		
Less printing bill unpaid		1,747.60	$1,100.00
Current Anthropological Literature			362.04
Illustrations for *Amer. Anthropologist*			402.76
Expenses of Secretary and Acting Treas.			249.65
Expenses of Editor			240.91
Refund for overcharges			13.64
Postage stamps			1.57
Total Expenditures			2,370.57
Balance on hand			212.63
			$2,583.20

GEORGE GRANT MACCURDY,
Acting Treasurer.

REPORT OF THE AUDITING COMMITTEE

Your Committee calls the attention of the Association to the fact that (during the Treasurership of Mr. Hyde) it had been necessary to draw upon the permanent fund, which had accumulated primarily through life memberships, and that this fund has been entirely exhausted.

The receipt book of the Acting Treasurer shows an excess of nine dollars ($9.00) over the total given above but this apparent discrepancy is plainly due to a slight error in entering the accounts. The balance in favor of the Association, as shown in the last statement of the New Haven Bank, agrees with that in the above report and the Committee is therefore pleased to ratify the account as submitted.

In approving the report of the Acting Treasurer, the Committee cannot refrain from expressing a word of appreciation of his untiring efforts in behalf of the Association. His has been a trying task and the faithfulness with which he has guarded the interests of the Association merits the commendation of all.

Signed:

TRUMAN MICHELSON,
NEIL M. JUDD,
Auditing Committee.

WASHINGTON, D. C.,
January 3, 1916

Following the reading of the Acting Treasurer's Report, a Committee on Ways and Means consisting of Franz Boas, P. E. Goddard, F. W. Hodge, and G. G. MacCurdy was appointed with power to act. This Committee reported at a later session of the Council:

WASHINGTON, D. C.,
December 31, 1915.

Your Committee, appointed with power to act, has given full consideration to the question of finances connected with the publications of the American Anthropological Association, and have reached the following conclusions:

1. That after 1916 no subscriptions for the annual volumes of the *American Anthropologist*, except for the back volumes, will be received, but that this journal will be sent only to members of the Association (including those of its local affiliated societies); but single copies and back numbers may be sold at rates to be determined by the Executive Committee.

2. That the *American Anthropologist* shall be supplied to the American Ethnological Society and the Anthropological Society of Washington for the use of their members at $3.50 per annual volume, this charge to include the cost of wrapping and mailing.

3. That the *Memoirs* shall be sent without charge to the members of the American Anthropological Association and to those members of the American Ethnological Society and the Anthropological Society of Washington, who receive the *American Anthropologist* through those Societies.

F. W. HODGE
P. E. GODDARD
FRANZ BOAS
GEORGE GRANT MACCURDY

The report of the Committee on Ways and Means led to the proposal of certain amendments to the Constitution as indicated below, the proposal being duly signed by Franz Boas, F. W. Hodge, and G. G. MacCurdy and referred to the Council at its final meeting on December 31:

ARTICLE III. *Membership*

By adding "or institutions" to Section 2, so that when amended the Section will read: "Persons or institutions interested in Anthropology may be elected on nomination of two members of the Association, and on payment of dues shall become Members of the Corporation, with full rights of voting and holding office."

By substituting for "member" the words: "person but not a library or other institution," to Section 3, so that when amended it will read: "Any person but not a library or other institution may become a Life Member on payment of $100 at one time."

ARTICLE IX. *Finances and Property*

By omitting: "for members of the American Association for the Advancement of Science and of the American Folk-Lore Society the annual dues shall be $5.00," from Section 3, so that when amended it will read: "The annual dues of members shall be $6.00; for members of local affiliated societies that subscribe for the *American Anthropologist* for each of their members and which have adopted the *American Anthropologist* as their official organ, the dues shall be $1.00."

REPORT OF THE EDITOR

At the time of the Philadelphia meeting in 1914 quite a part of Volume 17, Number 1 of the *American Anthropologist* was in type. The former editor, Mr. F. W. Hodge, carried that number through the press.

During the year the unusual conditions in Europe have been considered and articles by anthropologists residing in the countries at war and affected by the war have been solicited and several have been printed. It is hoped that in the future the *American Anthropologist* may be less confined to America both as regards its subject matter and its contributors.

It seems desirable that the *American Anthropologist* should become a medium of discussion, both of method and fact; for that reason articles raising points on which there is a chance for difference of opinion have been welcomed. As the output of anthropological writing increases it will be necessary to give preference to the shorter contributions and exercise more discrimination as to the character of the articles admitted. It seems but fair that if all articles offered cannot be printed that those of the recognized anthropologists should have preference. The financial condition of the Association is such that illustrations must be sparingly used unless the authors pay for the engraving.

PLINY E. GODDARD,
Editor

A number of important resolutions were adopted; some of these were in the nature of joint resolutions, others concerned only the American Anthropological Association, as will be seen from the context:

RESOLUTION RELATING TO THE DESIRABILITY OF UNIFORM LAWS CONCERNING ARCHEOLOGICAL EXPLORATION

Section I

WHEREAS, many parts of the American continent are rich in archeological remains, such as ruins, monuments and burial sites, containing many examples of industry and art of the aborigines;

AND WHEREAS, scientific explorations of these remains with the study of resulting finds are objects of utmost importance, for on their basis only will it become possible to reconstruct the lost history of the American race;

AND WHEREAS, in order that such remains may be saved to science and not be wantonly exploited or destroyed before they could be studied, it is essential that proper laws and regulations be adopted by the various countries where such remains exist, the object of such laws and regulations being to hinder or prevent as far as possible the digging or other destruction of such remains by unqualified persons; to prevent trade in pottery and other articles recovered from the ruins and graves, and at the same time not only to enable properly qualified scientific men both indigenous and of other countries to undertake and carry on scientific explorations and collections,

AND WHEREAS, the majority of the American Republics have now some laws relating to antiquities, although these laws are unlike in the different countries and in some instances are such that they have resulted more in restraining than in advancing properly qualified research;

Therefore it is hereby resolved by the Second Pan-American Congress, that it is highly desirable that the various American Republics arrange by the appointment of suitable delegates, possibly from among their official representatives at Washington, for joint action on this important subject, with the view of formulating generally acceptable and substantially uniform laws relating to the conservation, exploration and study of archeological remains in their several jurisdictions; laws which on one side will effectively safeguard these remains from wanton destruction or exploitation, and on the other will aid and stimulate properly organized and accredited research in these directions.

RESOLUTION RELATING TO THE ADVANCE OF ANTHROPOLOGICAL RESEARCH IN THE VARIOUS AMERICAN REPUBLICS

WHEREAS, in various parts of the American continent there are remnants of the aborigines population, a study of which is of great importance to science;

AND WHEREAS, many of these remnants are very imperfectly known and are rapidly disappearing;

AND WHEREAS, properly made and preserved collections, ethnological and physical, are among the most precious scientific and educational assets of a nation;

Therefore be il resolved by the Second Pan-American Congress, that delegates to the Congress be urged to use every opportunity to impress upon their respective governments, institutions, and people the importance of promoting research in this field, of organizing surveys for the study of the primitive tribes, and of building up national and local museums for the preservation of the data and materials collected.

The two foregoing resolutions were passed not only by the American Anthropological Association but also by the International Congress of

Americanists, the latter providing for an intermediary local bureau in Washington consisting of W. H. Holmes, F. W. Hodge, and A. Hrdlička.

RESOLUTION ON THE DEATH OF PROFESSOR FREDERIC WARD PUTNAM
(Prepared by Alfred M. Tozzer and Marshall H. Savilie)

WHEREAS, by the death of Professor Frederic Ward Putnam, the American Anthropological Association has lost one of its most eminent founders, one of its most eminent supporters, and one of its most lovable characters;

Be it resolved that the Association here express the sense of this great loss to American Anthropology, a loss that is felt not only by the many pupils of Professor Putnam in the several institutions throughout the country, but also by those who have long been connected with Professor Putnam through all the years of struggle to make Anthropology a recognized field of scientific endeavor; and *be it further resolved* that these minutes be spread upon the records of the Association and also be sent to the members of Professor Putnam's family.

RESOLUTION OF THE AMERICAN ANTHROPOLOGICAL ASSOCIATION RELATING TO THE DESIRABILITY OF RESUMING THE OPERATIONS OF THE ETHNOLOGICAL SURVEY OF THE PHILIPPINE ISLANDS

(Prepared by Edward Sapir and R. H. Lowie)

The members of the American Anthropological Association have learned with great regret of the decision to suspend the operations of the Ethnological Survey of the Philippine islands. The native populations of the Philippine islands are among the most interesting of the globe from a scientific point of view. They include a pygmy race whose study will shed light on the physical anthropology and culture of one of the most primitive divisions of mankind. On a higher level a host of Malay tribes require investigation for the purpose of determining their relations with one another and with alien groups. In short, the Philippines offer an unusually rich field for important research which should not be left to the accident of private interest.

It is therefore respectfully urged by the American Anthropological Association that the proper authorities authorize the resumption of anthropological research in the Philippine islands at the earliest opportunity.

On January 19, 1916, the Secretary received a reply from Mr. J. L. Hunt, assistant to the Chief of the Bureau of Insular Affairs (War Department), from which the following is taken:

"Anthropological work which has been carried on in the Philippine islands has not been done by the Federal government or maintained at Federal expense, but has been carried on by the Philippine government through its Bureau of Science. Some months ago the Philippine government found it necessary to greatly curtail its expenses on account of a considerable falling off in its revenues, and among other activities of the Philippine government which had to be suspended or discontinued were those in connection with anthropology.

"A copy of your letter is being transmitted with its inclosure to the Governor General of the Philippine islands at Manila for consideration by the proper authorities there."

RESOLUTION FAVORING BILL TO DISCONTINUE THE USE OF THE FAHRENHEIT THERMOMETER SCALE IN GOVERNMENT PUBLICATIONS

WHEREAS, there is now pending in Congress a Bill, known as H. R. No. 528, to discontinue the use of the Fahrenheit thermometer scale in Government publications;

Be it resolved that said Bill have the support of the American Anthropological Association.

A vote of thanks to the Regents and Secretary of the Smithsonian Institution for the facilities so generously placed at the disposal of the Association and for the reception at the National Museum was unanimously carried.

The Chair appointed a Committee on Nominations consisting of A. L. Kroeber, M. H. Saville, G. G. MacCurdy, A. M. Tozzer, and R. H. Lowie, whose report was accepted by the Association, the election of officers resulting as follows:—

President: F. W. Hodge, Bureau of American Ethnology.
Vice-President, 1916: A. L. Kroeber, University of California.
Vice-President, 1917: George B. Gordon, University of Pennsylvania.
Vice-President, 1918: Berthold Laufer, Field Museum of Natural History.
Vice-President, 1919: Alfred M. Tozzer, Harvard University.
Secretary: George Grant MacCurdy, Yale University.
Treasurer: Neil M. Judd, U. S. National Museum.
Editor: Pliny E. Goddard, American Museum of Natural History.
Associate Editors: J. R. Swanton, R. H. Lowie.
Executive Committee: The President, Secretary, Treasurer, and Editor (*ex-officio*), C. Wissler, E. Sapir, J. W. Fewkes.
Council: F. Boas, W. H. Holmes, J. W. Fewkes, R. B. Dixon, F. W. Hodge, A. L. Kroeber, George B. Gordon, B. Laufer, A. M. Tozzer, G. G. MacCurdy, Neil M. Judd. P. E. Goddard (*ex-officio*); Byron Cummings, G. H. Pepper, W. C. Farabee, J. R. Swanton, G. G. Heye, H. J. Spinden, T. T. Waterman, C. M. Barbeau, W. D. Wallis, A. B. Lewis, Stansbury Hagar (1916); W. C. Mills, H. Montgomery, C. B. Moore, W. K. Moorehead, E. K. Putnam, C. Peabody, C. C. Willoughby, T. Michelson, A. B. Skinner, M. H. Saville (1917); Alice C. Fletcher, C. P. Bowditch, S. Culin, R. H. Lowie, C. H. Hawes, E. Sapir, N. C. Nelson, H. Bingham, J. A. Mason, G. A. Dorsey, E. W. Gifford (1918); A. E. Jenks, S. A. Barrett, W. Hough, A. Hrdlička, B. T. B. Hyde, C. Wissler, F. G. Speck, A. A. Goldenweiser, E. A. Hooton, A. V. Kidder, F. C. Cole (1919).

The incoming President, Mr. F. W. Hodge, has appointed the following committees:

Committee on Program: George Grant MacCurdy (chairman), Roland B. Dixon, Alice C. Fletcher, Aleš Hrdlička, A. L. Kroeber, Berthold Laufer, Clark Wissler.

Committee on Finance: Charles Peabody (chairman), Edward E. Ayer, Charles P. Bowditch, William H. Furness, George G. Heye, Clarence B. Moore, Homer E. Sargent.

Committee on Policy: Franz Boas (chairman), Roland B. Dixon, J. Walter Fewkes, W. H. Holmes, Robert H. Lowie, George G. MacCurdy.

Committee on Publication: F. W. Hodge (chairman *ex-officio*), Hiram Bingham, Stewart Culin, P. E. Goddard (secretary *ex-officio*), A. A. Goldenweiser, G. B. Gordon. Walter Hough, Neil M. Judd, A. L. Kroeber, Berthold Laufer, E. Sapir, M. H. Saville, John R. Swanton, A. M. Tozzer

To represent the Association on the Council of the A. A. A. S.: W. H. Holmes and Franz Boas.

On invitation from Dr. P. E. Goddard, it was voted to hold the next regular meeting of the Association at the American Museum of Natural History, New York City, on December 27–30, 1916, in affiliation with Section H of the American Association for the Advancement of Science.

Nearly one hundred titles were offered in the joint program; with but few exceptions the author was present and read his paper. A large majority of the abstracts were presented through the International Congress of Americanists in the published report of which the more important papers will appear in full.

PROCEEDINGS OF THE ANTHROPOLOGICAL SOCIETY OF WASHINGTON

Meeting of October 13, 1915.

At the 488th meeting of the Society, held October 13, 1915, in the Public Library, jointly with the Medical Society of the District of Columbia, Dr. Aleš Hrdlička, Curator in Physical Anthropology, U. S. National Museum, delivered an address on "The Evolution of Man in the Light of Recent Discoveries, and its Relation to Medicine." Human evolution is no longer a mere theory but a fixed part of natural history, better documented from day to day by substantial evidence. Its foundations rest upon many and important organic analogies; on actual physical remains of early man and perhaps even some of his predecessors; and on observations of the changes which are at present taking place in man. The analogies are (1) the evidence of evolution in all the better known mammals; (2) the relation of various stages of the embryonic development of man to grades of life represented by some lower vertebrates; (3) those of the mode of conception, of the laws of development, of all other vital functions, and in death; (4) similarities in organs, limbs, and all other physical as well as microscopic parts of the human body; (5) close similarities in the chemical constituents of the human body and those of other mammals; and (6) the frequent presence in man of vestiges of or reversions to anatomical features still present regularly in some lower animals.

The physical evidence of man's evolution consists of a large series of skeletal remains dating from the early Pleistocene to the last prehistoric period. These remains show in general that the farther back we proceed the more primitive were the human features and the nearer to those of the lower primates. This evidence alone is quite conclusive although there are still of course, many important gaps in the line of this evidence, especially relating to the earlier periods, which however are gradually being filled in. The historical and recent changes in man show us that his evolution has not as yet been fully accomplished, but is still progressing, and that possibly among civilized white men it is progressing more rapidly than it has during most of its course. We see that the higher civilized white man has already in some respects outdistanced others,

that he is rapidly diversifying, and that those who can not keep the accelerated pace are being eliminated by nature. Probably the most obvious changes are taking place in his teeth, which are gradually lessening in resistance, in size, and even in numbers—changes which in turn condition weakening and numerous disharmonies in the whole facial structure.

The process of human evolution has close relations to medicine—much closer, in fact, than is commonly appreciated by even the surgeon and physician. Evolution is not only constructive, but eliminative, involving weakening, degeneration, and eventual loss of parts which have become less useful, less functional. The progressive and retrogressive changes are not always harmonious or generally beneficial to the individual, and they bring about many conditions which demand medical or surgical intervention. The process of evolution bears, however, still older relations to medicine. It has prolonged the periods of infancy, childhood, and senility in man, the most dangerous periods of an organism; the assumption of the erect posture had necessarily adverse consequences, which probably have not yet been completely overcome, on the circulatory system and in seriously modifying the abdominal and pelvic drags as well as pressure, especially in pregnancy; it has intensified the sexual functions in man, the results of which are frequently untoward and even dangerous; it has caused an enlargement in the size of the head in the human foetus, which necessitated a consequent enlargement of the pelvic cavity, and there are doubtless still disharmonies between the two conditions; it has resulted in greater relative slenderness of bones, even in the skull, rendering them proportionately more liable to injuries; it has brought about greater delicacy of skin, with a consequent less resistance of the body to exposure; it has induced especially a great enlargement of the brain, a process the results of which to this day offer many imperfections; and, finally, while evolution has doubtless improved various immunities in man, it is still very incomplete in this respect, and on the other hand it has evidently led to new dangers and predispositions. There seem to exist even some indications that it may in some of the most advanced groups adversely affect the ability of procreation. The evolution of man will continue, and in order that it shall proceed with the least harm and towards the greatest benefit of mankind, it will require the most enlightened and increasingly important help and service of all branches of medicine.

The paper was well illustrated and briefly discussed.

Meeting of October 19, 1915

At the 489th meeting of the Society, held October 19, 1915, in the Public Library, Dr. D. S. Lamb, of the Army Medical Museum, read a paper on "The Medicine and Surgery of the Ancient Peruvians," giving first some account of the country and its people, their history, customs, food, and religion. We have no evidence of hospitals in old Peru. The people are said not to have studied the medicinal properties of their plants, although they well knew the properties of what is called Peruvian bark, used in malarial fevers. Whether syphilis or leprosy occurred among them is doubted. The same may be said of tuberculosis, although some writers, like Ashmead, ascribe the mutilations represented on their pottery to local skin tuberculosis, usually known as *lupus*. These mutilations have also been regarded as resulting from punishments or surgical operations. Three skin diseases are considered peculiar to the ancient Peruvians, the *mirunta*, caused by a worm entering the skin; the *verrugas*, a very fatal disease of a warty character that struck terror into Pizarro's soldiers in 1532; and the *uta*. They had the climatic, dietetic, respiratory, and heart diseases found elsewhere, and from similar causes. Malarial fevers prevailed and were usually of the tertian variety. Smallpox, measles, scarlet fever, and yellow fever were introduced by the Spaniards and their successors. The Peruvians had what seems to have been a typhus called *tabardillo*. Goitre prevailed and was said to be caused by drinking the turbid water from the mountains. They deformed the heads of their infants, very much as did the Flathead Indians of the northwestern United States, by pressure front and back; one tribe is said to do so still. Their injuries were necessarily, for the most part, much the same as now, with the exception of shot wounds and injuries caused in modern industrial occupations. They scarified and let blood, reduced dislocations, used fixation apparatus for fractures as we do, covered open wounds, cut out *pterygiums*, and trephined the skull. This trephining was done either directly to relieve disease and injury or simply to let out the demon that caused the trouble.

In discussing Dr. Lamb's paper, Dr. C. L. G. Anderson said that the predecessors of the Inca also, the people who built the megaliths at Tiahuanaco and the great fortress at Cuzco, likewise knew much about medicinal herbs. The Indians made infusions, decoctions, powders, and ointments of barks, leaves, berries, roots, and vines. A few remedies were obtained from the mineral kingdom, such as sulphur and salty earths. Certain baths and hot springs were utilized in curing rheumatism and various skin diseases. Garcilasso de la Vega says that the use of drugs

was largely prophylactic and that after the disease was well established they left nature to work its cure, merely regulating the diet. The basal idea was to eliminate the evil, whether spirit or substance. Hence, purgatives and venesection were much in vogue, as among all nations.

Throughout tropical America, the wood of the *guayacan* tree, *lignum vitae*, was held to be a specific for the venereal disease called by the Spaniards *las bubas*. Sarsaparilla was said to be the great panacea about Guayaquil. The wonderful drugs *coca* and *quina-quina*, were peculiar to the Andean regions. The coca was chewed to ward off hunger and fatigue. Quina, later known as Peruvian bark, was the cure for fever. It was introduced into Europe about 1640. Among the common people, old women were herbalists. The newborn babe was bathed in cold water. Usually no midwife was employed. The Peruvians knew of many poisons. Witchcraft and divination were practised.

Mr. J. N. B. Hewitt spoke of the idea of getting the evil spirit out of the patient as being common to all primitive peoples. In the Iroquois language the expression in case of sickness was "It is biting me," "biting my tooth," or "biting my head," according to the affected part. Dr. E. L. Morgan, among others who discussed the paper, considered that trephining probably had its origin in the idea of getting rid of the evil spirit but was continued as a custom because of the curative results observed in some cases. Dr. Lamb, in response to an inquiry, said that the flattening of the head among the ancient Peruvians, as among the Flathead Indians, probably had no effect on the intellect because it was practised in infancy.

Meeting of November 2, 1915

At the 490th meeting of the Society, held November 2, 1915, in the Public Library, Dr. Walter Hough, of the U. S. National Museum, spoke on "Progress in Anthropology in California." He first discussed the problems connected with the populating of California by the Indians, giving a general view of the geographical obstacles and the avenues to the north and south by which migrants entered. The conditions as to food, water, and means of transportation were shown to have greatly influenced the condition and direction of the migrations. A brief review was given of the numerous stocks of Indians in California and attention called to the similarity as to the prevalence of numerous tribes in the Mexican gulf area studied by Dr. J. R. Swanton. The Pacific coast was described as a vast ethnic enclave, a veritable swarming place of tribes, whose origin, antecedents, and development in most instances perplex

the ethnologist. California presents a most interesting field of study to anthropologists. Californian historians are alive to the value of these studies as a groundwork for history, and the speaker mentioned the work of H. H. Bancroft, Charles F. Lummis, Robert E. Cowan, and others who have contributed valuable work.

Progress in museum display of anthropological material was noted and the great collections in San Francisco and Los Angeles described. The speaker found evidence of the increasing growth of civic pride in sustaining the work and adding to the effectiveness of museums. It was said also that the University of California is a force for anthropological science in California, and the intelligent patronage of Mrs. Phoebe A. Hearst in this direction was praised since she had made possible the important researches of Dr. A. L. Kroeber and others and the enriching of a great museum through exploration. An account was given of the work in the more than 400 shell mounds of San Francisco bay carried on by E. W. Gifford, N. C. Nelson, and T. T. Waterman, and of the explorations among the Indian tribes.

The two great expositions which California has successfully carried on this year are of great import to anthropology, especially that at San Diego, where this subject was preëminent, the San Francisco Exposition being mainly devoted to modern progress. This anthropological exhibit of the former, which was prepared by Prof. W. H. Holmes, Dr. Aleš Hrdlička and others of the United States National Museum in cooperation with Dr. E. L. Hewett, has never been excelled, and it will be a permanent contribution to California. The speaker said, in closing, that there is being built up on the West Coast a people of general culture who are appreciative and receptive of the researches of science. It augurs well for the science of anthropology here that it has an alert public which aids in the extension of its activities—a public that demands and can assimilate its results.

Meeting of December 7, 1915

At the 491st meeting of the Society, held in the Public Library, December 7, 1915, Mr. Francis LaFlesche, of the Bureau of American Ethnology, read a paper on the "Right and Left in Osage Rites." The Osage, at the formative period of their tribal organization, had arrived at the idea that all life proceeded from the united fructifying powers of two great forces, namely, the sky and the earth. They also perceived in these two forces an inseparable unity by which was made possible the continuity of the life proceeding from them. It was upon these con-

ceptions that they founded their complex gentile organization. They first divided the people into two great divisions, one of which they called "Tsi-zhu" (household), symbolically representing the sky, and the other, "Ho^n-ga" (sacred), representing the earth. These two great symbolic divisions they brought together to form one body which they likened to a living man. He stood facing the east, the left side of his body, the Tsi-zhu division, being to the north, and the right side of his body, the Ho^n-ga, being to the south.

When a war party including men of both the great tribal divisions was being organized, the people pulled down their wigwams and reset them in a ceremonial order, which was in two squares with a dividing avenue running east and west. In this arrangement the position of the symbolic man was changed so that he faced the west; consequently the right side of his body, the Ho^n-ga division, was at the north, and the Tsi-zhu division, at the south. All the ceremonial movements were made in reference to the right and left side of the symbolic man, as was also the placing of the symbolic articles used in the ceremonies. The portable shrine has a right and a left side. When the ceremonies of the tribal war rites were being performed, the shrine was put in its place so that the left was toward the Tsi-zhu and the right toward the Ho^n-ga. When a man was initiated into the mysteries of the war rites, the shrine of his gens was temporarily transferred to his keeping. If he belonged to the Ho^n-ga division he hung the sacred article at the right side of his door when viewed from within; if he belonged to the Tsi-zhu division, he hung it at the left of his door. A woman for whom a sacred burden-strap had been ceremonially made, hung the sacred article at the right side of her door if she belonged to the Ho^n-ga division, at the left side if she belonged to the Tsi-zhu division. The observance of right and left pertained to many details connected with the tribal ceremonies and appeared in the daily customs of the people.

The paper was discussed by Miss Alice C. Fletcher and Messrs. Hodge, Swanton, Fewkes, Mooney, and Michelson, among others. Similar dualistic concepts regarding right and left or earth and sky as determining social relationships and fundamental modes of conduct were reported as found in widely separated tribes, such as the Hopi of the Southwest and the Piegan of the north. The discussion centered largely upon the significance of 7 and 6 as sacred numbers, which are found widely spread in ancient and oriental nations as well as in America. Several members referred the origin of 6 as a sacred or occult number to the six "cardinal points," north, south, east, west, up, and down. The number

7 adds to these the concept of the center between the points. Dr. Fewkes referred at length to his earlier studies of the preference given the left hand in the sacred mysteries of the Zuñi and what he has called the "sinistral circuit," which was followed, for instance, in Zuñi processions and by anyone approaching the kiva. Some theories account for this significance of the left side by being the side where lies the heart and the side which supports the shield in battle. Miss Fletcher dwelt upon the intellectual and especially the poetic and anthropomorphic character of these concepts of the Indian thinker who faces nature in the open and feels impelled to think out and give reasons for things. Is not the sky side, the left, in the Osage conception given the place of honor because of a deep feeling of its religious significance?

DANIEL FOLKMAR,
Secretary

ANTHROPOLOGICAL NOTES

A Note on Blackfoot Relationship Terms

In the *Internationale Archiv für Ethnographie*, XXIII (1915), p. 140, Professor Uhlenbeck comments on Mr. Leslie Spier's remarks on Blackfoot relationship terms which were published in this Journal, 1915, pp. 603–607. Professor Uhlenbeck has quite misunderstood the purpose of Mr. Spier's contribution. At my instance Mr. Spier examined with great care the extant data on Blackfoot kinship nomenclature. As he points out, Morgan's comprehensive tabulation is vitiated by obvious errors, contradictions, and atrocious phonetics. Unfortunately, the resulting perplexities have not been eliminated by later lists, however superior in other respects, for the simple reason that they are not co-extensive with Morgan's. To call attention to the existing difficulties and to "stimulate the acquisition of new material for the correction of the old" was Mr. Spier's sole object. Professor Uhlenbeck, oddly enough, seems to suppose that Mr. Spier has sucked his Blackfoot kinship terms out of his thumbs. He blames him for assuming the existence of an *r* sound and for correlating Piegan *d* with Blood *t*. Mr. Spier simply transcribed the forms given by Morgan. If Professor Uhlenbeck and Dr. Michelson shall be led to publish complete and phonetically accurate schedules of Blackfoot terminology to supplant Morgan's lists, Mr. Spier's plea will not have been in vain.

Robert H. Lowie

The President of the United States has performed a dual service to science in creating, by proclamation dated February 11th, 1916, the Bandelier National Monument in New Mexico. This monument, which has been set aside under the provisions of the Act of Congress of June 8, 1906, is designed for the purpose of affording protection against vandalism and unlawful excavation of the ancient pueblo ruins and other aboriginal remains lying within an area of more than twenty thousand acres of land within the limits of the Santa Fé National Forest, which include such important objects as the cavate lodges of the Rito de los Frijoles, the Painted Cave, the Stone Lions, and the ruins of Otowi and Sankawi. Incidentally the name of the late Adolf F. Bandelier, whose highly important studies in the archeology and early Spanish history of the

Southwest under the auspices of the Archaeological Institute of America and the Hemenway Expedition are so well known, is perpetuated by the proclamation.

DR. ALBERT ERNEST JENKS, Professor of Anthropology, and Chairman of the Department of Sociology and Anthropology, University of Minnesota, has returned to the University the second semester of the academic year. He had leave of absence during the first semester to continue summer research on the subject of Indian-white amalgamation in Minnesota. This research was carried on for citizens of Minnesota who are defendants in suits brought by the United States Government in connection with transfer of land titles on the White Earth Reservation. In 1906 an act was passed by Congress, amended in 1907, allowing "mixed-blood Indians" to sell their White Earth allotments. The Government makes charge that certain lands were sold by pure-blood Indians under the pretense that said sellers were mixed-bloods. Of the nine court cases tried so far with anthropological evidence the Court has held that the sellers in eight cases were mixed-blood Indians.

ANNOUNCEMENT of some important discoveries is contained in a letter from Mr. Clarence B. Moore to Mr. F. W. Hodge, Ethnologist-in-Charge of the Bureau of American Ethnology. Mr. Moore says:

"We have just completed a month's steady work on a site on Green river Kentucky, where conditions were peculiarly favorable to the preservation of skeletal remains. We had the good fortune to obtain a large number of skulls and other bones in fine condition, a most unusual thing in investigation in the South.

"We have also demonstrated beyond doubt, from material obtained during our digging that the oblong, longitudinally-perforated "banner-stone" is in reality a sizer used by the aborigines to space the meshes in making nets."

The skeletal remains are to be presented by Mr. Moore to the United States National Museum.

AT the time of writing Mrs. W. S. Routledge is returning to England after an extended visit to Easter Island in the company of Mr. Routledge, who is taking their boat through the Panama canal. Mrs. Routledge devoted herself mainly to the less tangible aspects of native life, while her husband studied more particularly the archeology and material culture. Mr. and Mrs. Routledge will be remembered as the authors of an excellent monograph on the Kikuyu of East Africa entitled *With a Prehistoric People*. Before sailing Mrs. Routledge paid a visit to the

Affiliated Colleges Museum at San Francisco, the United States National Museum in Washington, and the American Museum of Natural History in New York.

MR. WARREN K. MOOREHEAD, of Andover, Massachusetts, is preparing a volume on Indian stone ornaments and problematical forms. He will be glad to receive communications from museum curators and those interested in technical study of prehistoric stone ornamental objects and the distribution of such forms. Mr. Moorehead will present a number of maps showing areas in which ornamental and problematical forms known as banner, winged and bird stones; charms and amulets, etc., are found. The relation of these to the distribution of linguistic stocks will be carefully indicated.

AT a meeting of the Managing Committee of the International School of Archaeology and Ethnology in Mexico held in New York on January 24, Señor Luis Castillo Ledón was elected President of the Managing Committee and Señor Manuel Gamio "*Encargado de los trabajos*." The work of the School for the present year will be under Señor Gamio's direction.

MAJ. FREDERICK H. E. EBSTEIN, U. S. A., retired, veteran of the civil and Spanish-American wars and of Indian fighting and regarded as an authority on the ethnology of the Indian race, died at his home in Brooklyn, February 9, 1916, aged sixty-nine years.

THE UNIVERSITY OF WASHINGTON is now offering courses in anthropology under the direction of its Department of Zoology. The lectures in ethnology are given by Professor Trevor Kincaid who writes that the courses are proving very popular.

MR. ALANSON SKINNER, assistant curator in the Department of Anthropology of the American Museum of Natural History since 1912, has resigned to take a position with the Museum of the American Indian, Heye Foundation.

THE Academy of Sciences at Vienna has granted a further subsidy of $960 to Professor R. Pöch to continue his anthropologic measurements and photographing of the various ethnologic types among the prisoners of war.—*Science.*

MR. ARTHUR CARPENTER, a Graduate Student of the Division of Anthropology, Harvard University, has left for an exploring trip to Guatemala under the auspices of the Peabody Museum.

MR. SYLVANUS GRISWOLD MORLEY, Carnegie Research Assistant, has started on a trip which will include Copan and Quirigua, Ocosingo, and several of the ruins on the Usumacinta River.

PROFESSOR WILLIAM H. HOLMES left Washington February 14, 1916, to visit the ruins of Quirigua and Copan where he is to spend a few weeks with Mr. Sylvanus Griswold Morley.

DR. WALTER HOUGH of the United States National Museum has gone to California to reinstall the San Francisco government exhibit in the San Diego exposition.

A UNIVERSITY OF CALIFORNIA expedition under Mr. Leonard Outhwaite has left for an archeological survey of certain islands of the Santa Barbara archipelago.

PROFESSOR HUTTON WEBSTER'S "Primitive Secret Societies" has just appeared in a Japanese translation by Professor M. Tasaki, of Nagasaki, Japan.

DR. H. KLAATSCH, associate professor of anthropology at Breslau, died on January 7, at the age of fifty-two years.

DR. J. ALDEN MASON is completing a study of the Salinan language for the University of California.

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